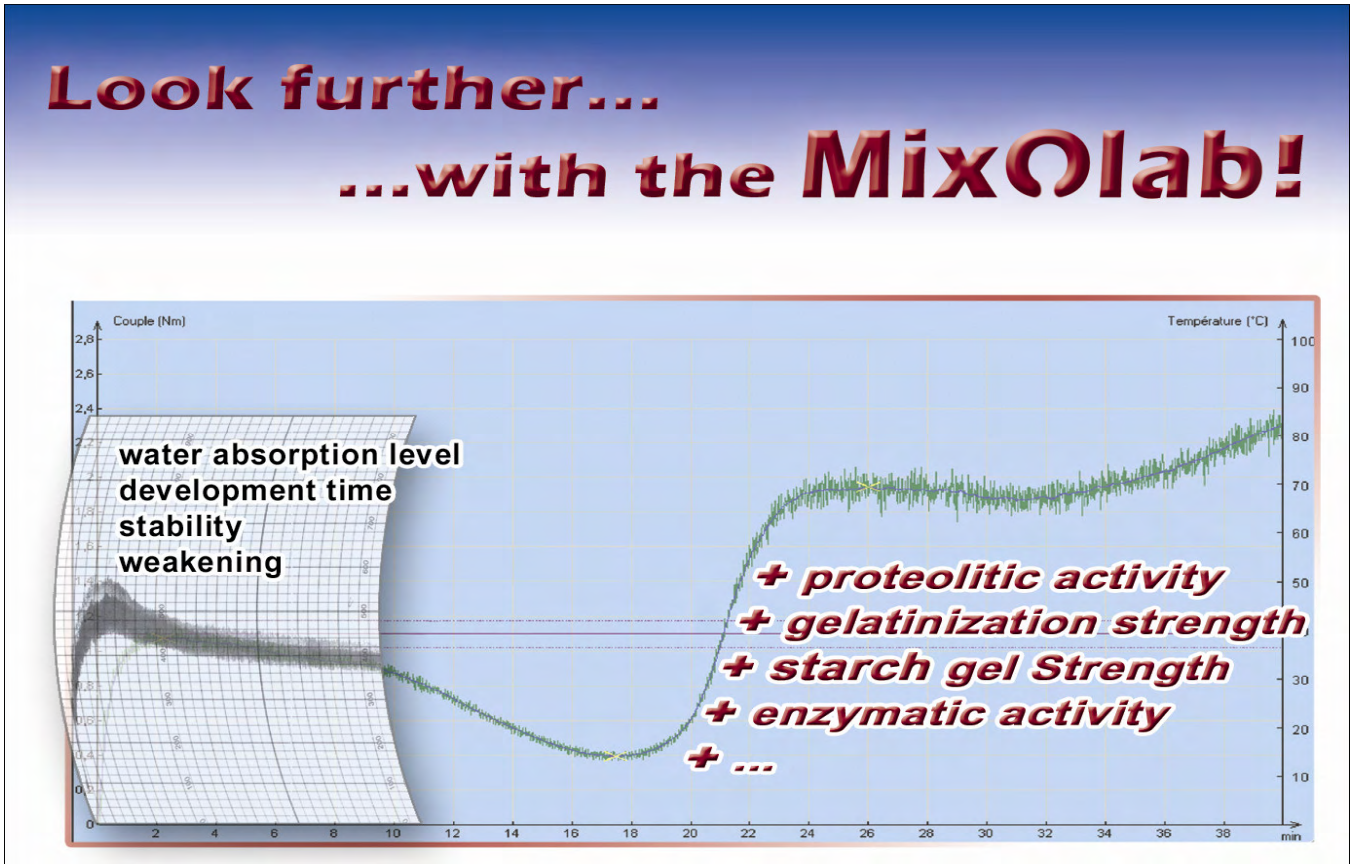
Monday 11/12 - 09:50-10:00 WN # 6 What's New

Mixolab device : the complete rheological tool

Chopin technologies-France
Mr.Charles Loubersac d'Hotel
Deputy Export Director

Look further…

N° 173



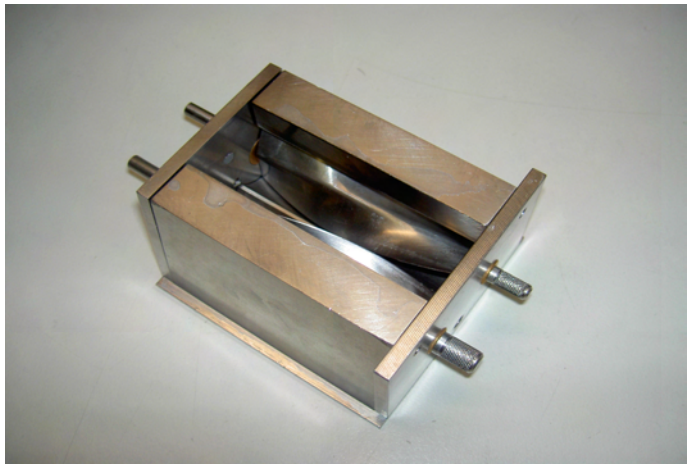
Mixolab

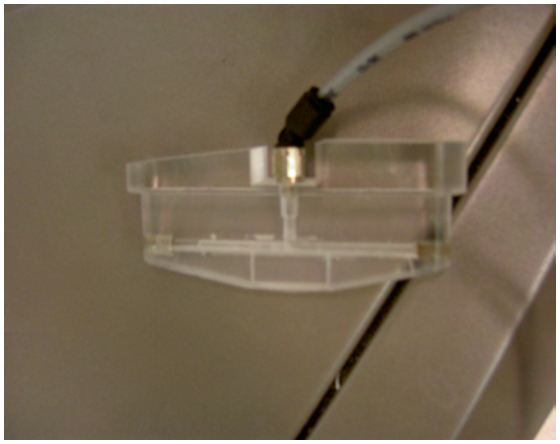
A new instrument to measure the dough properties during mixing and heating

Measurement

- Mixing properties
  - Water absorption
    - Mixing time
      - Stability
      - Weakening
- Starch gelatinization
- Enzymatic activity
- Starch retrogradation

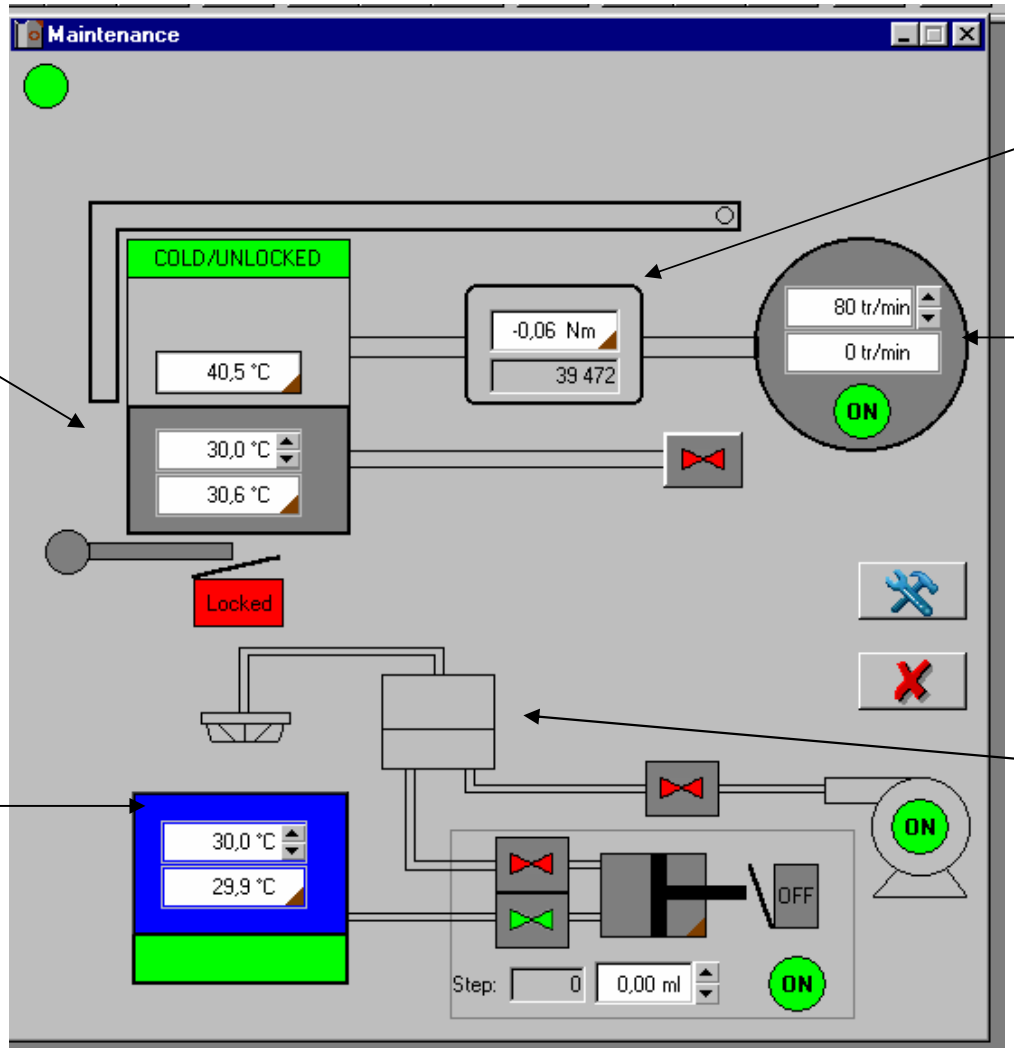
So easy : The Mixer Bowl & automated water injection





Only 50g samples

Operating & maintenance system : on a remote software



kneader

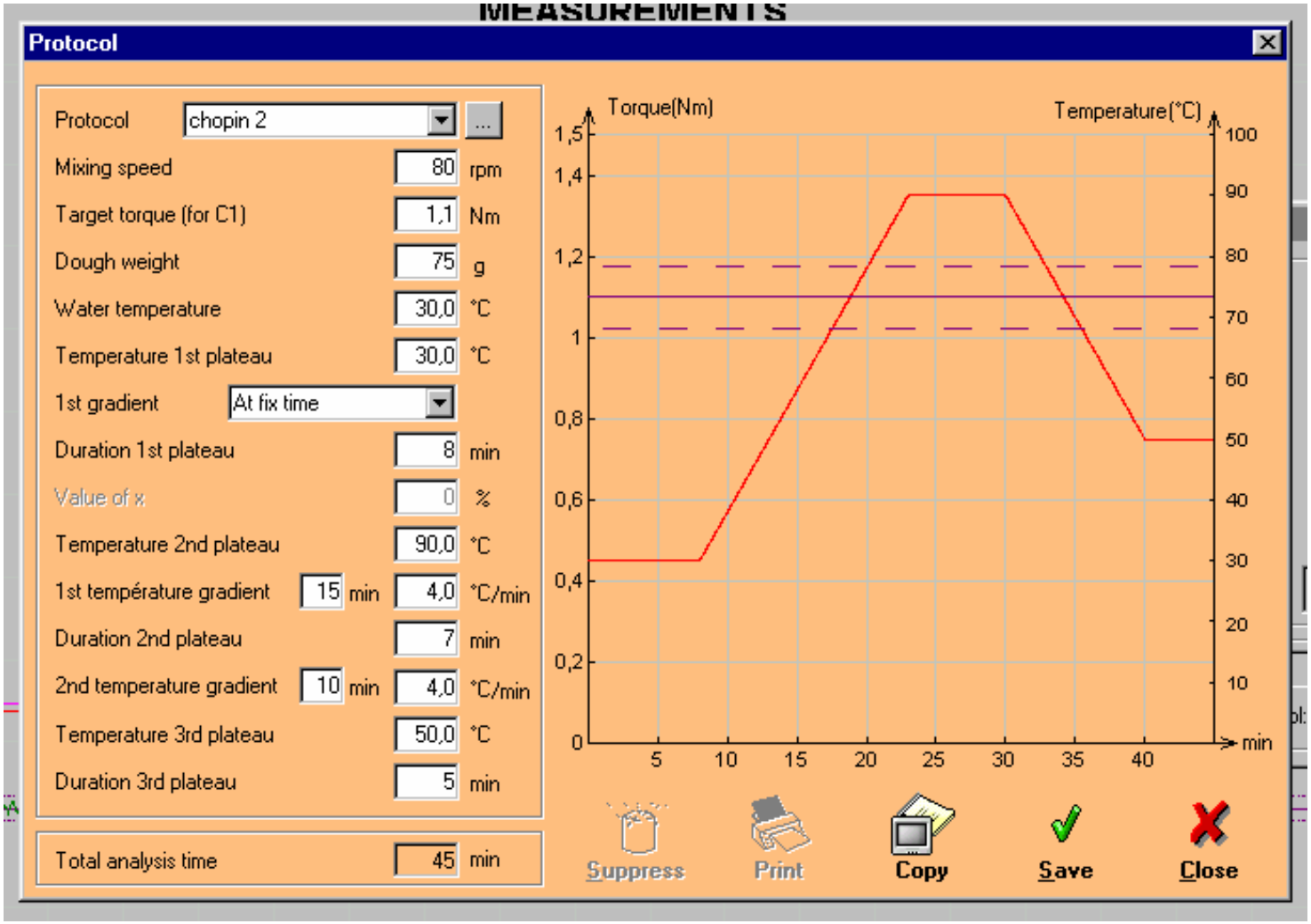
Sensor

Motor

Water tank

Injection system

1 standard protocol…

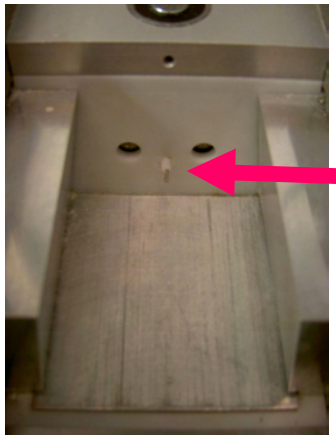


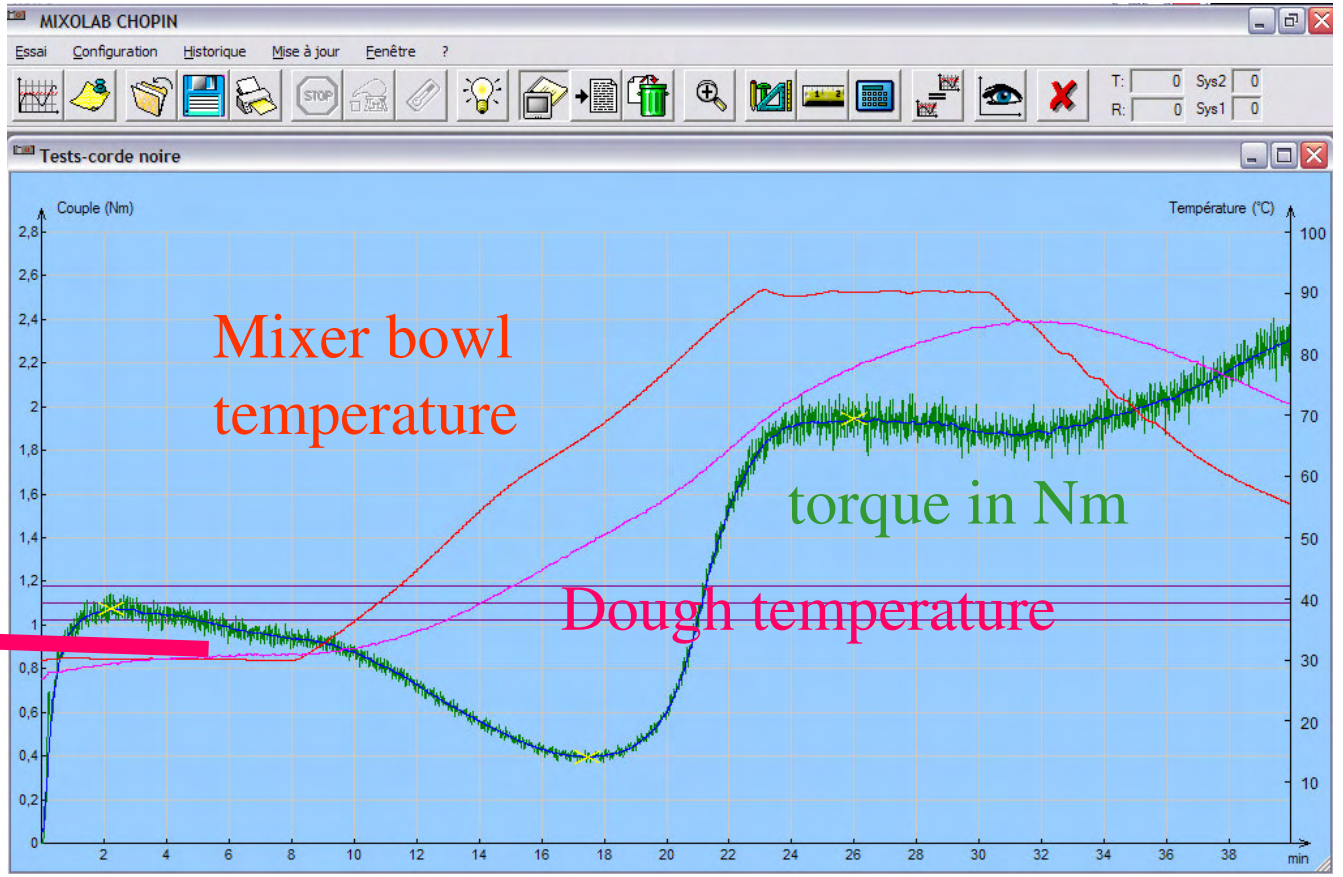
A completely customizable protocol

Parameters	Minimum	Maximum
Mixing speed	55 rpm	250 rpm
Torque	0,1 Nm	7 Nm
Water T°C	20°C	60°C
Mixer T°C	20°C	60°C
Maximum T°C	20°C	92°C
Heating gradient	2°C/min	12°C/min
Final T°C	20°C	92°C
Cooling gradient	2°C/min	12°C/min
All times	0 min	545 min
Maximum test time : 45 hours !		

Graph interpretation

Standard graph





Protein behaviour

Water Absorption : % of water required for the dough to produce a torque of 1.1 Nm

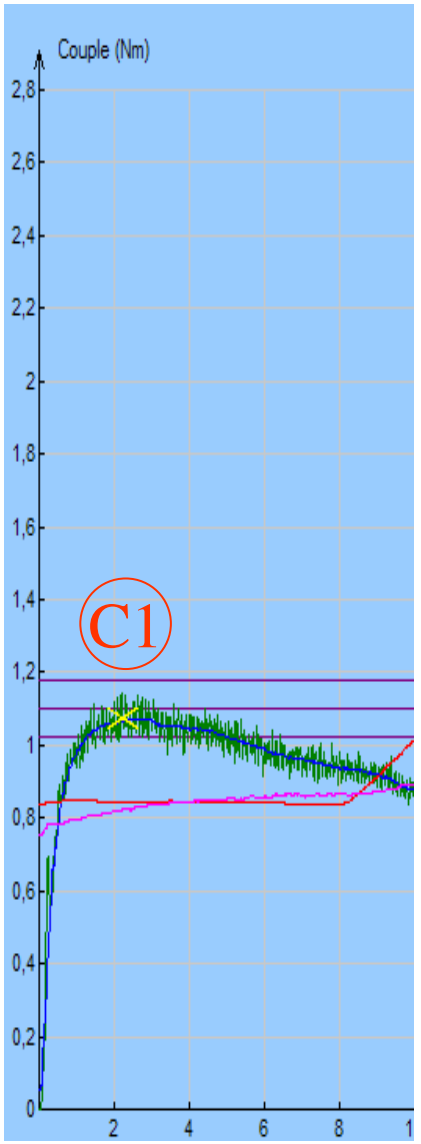
Development Time (min) : time to reach the maximum torque at 30°C

Stability (min) : elapsed time at which the torque produced is kept at 1.1Nm

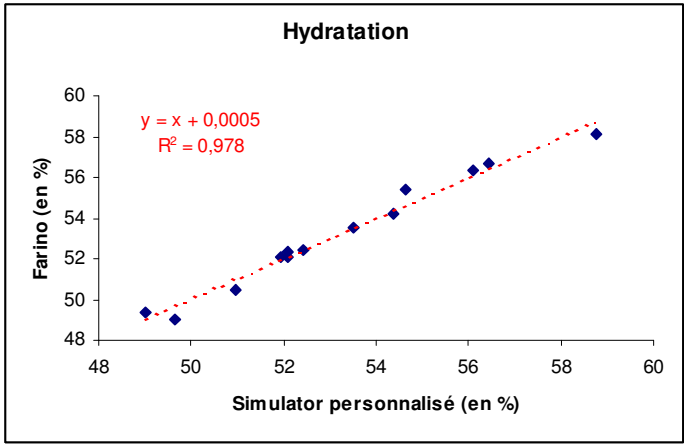
For high content protein :

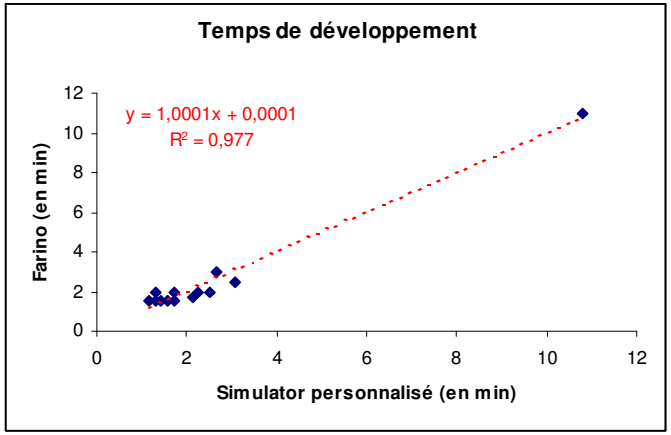
-Higher hydration because more protein molecules available to catch free water

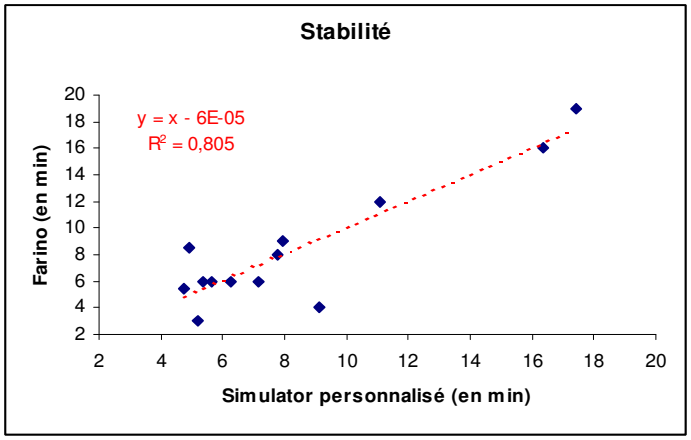
-Longer stability due to strength of protein molecules, it needs more energy to modify the network

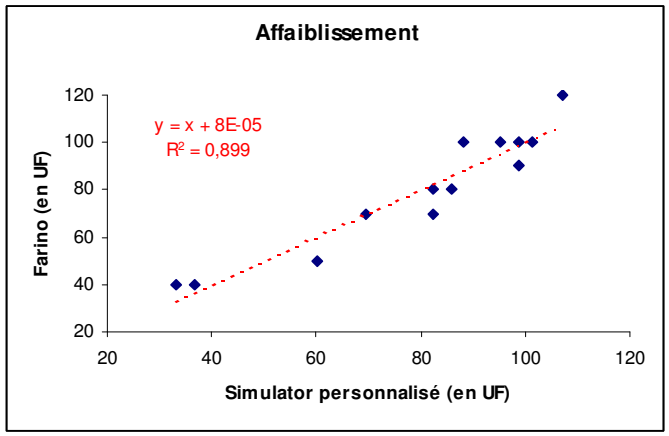


Farinograph comparison (Simulator protocol).









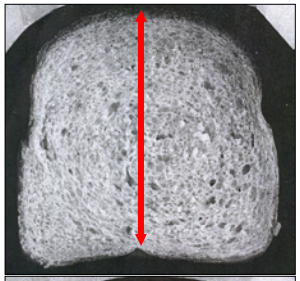
Protein behaviour

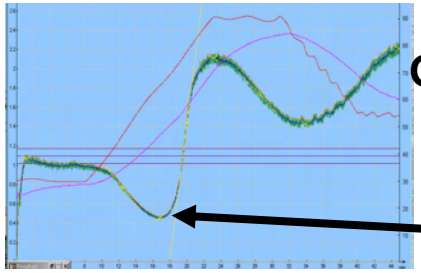
Minimum torque (Nm) : the minimum value of torque produced by dough passage subjected to mechanical and thermal constraints

Weakening (Nm) : difference between the torque at the end of the holding time at 30°C and the minimum torque

Upon heating, protein linkages are broken and protein are denatured

Sample A



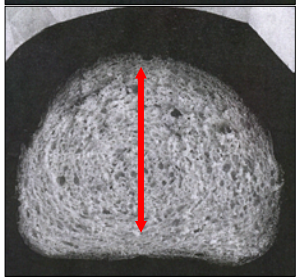


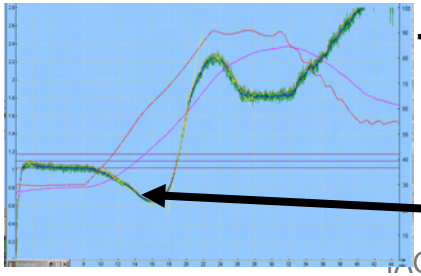
Good breadmaking quality

Good volume

C2 = 0.46 Nm

Sample N

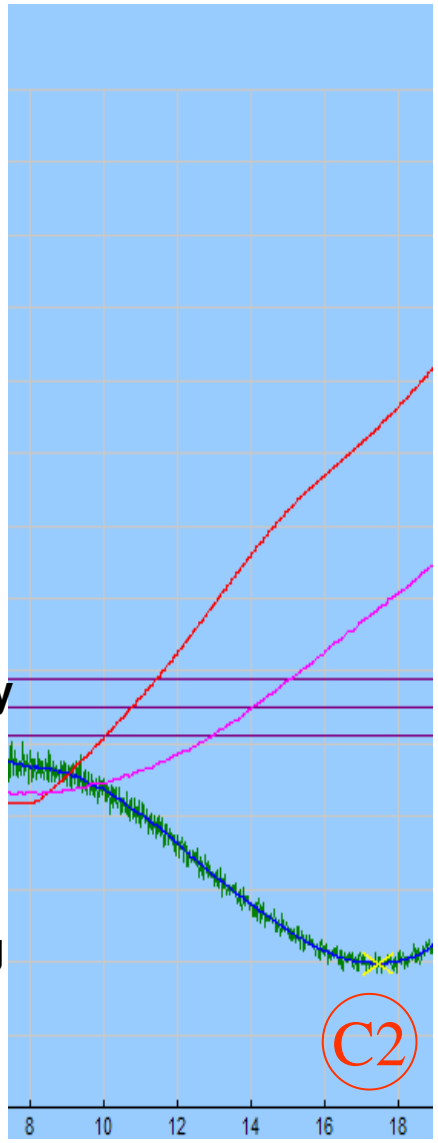




Tenacity problems during

Dough manipulation

C2 = 0.65 Nm

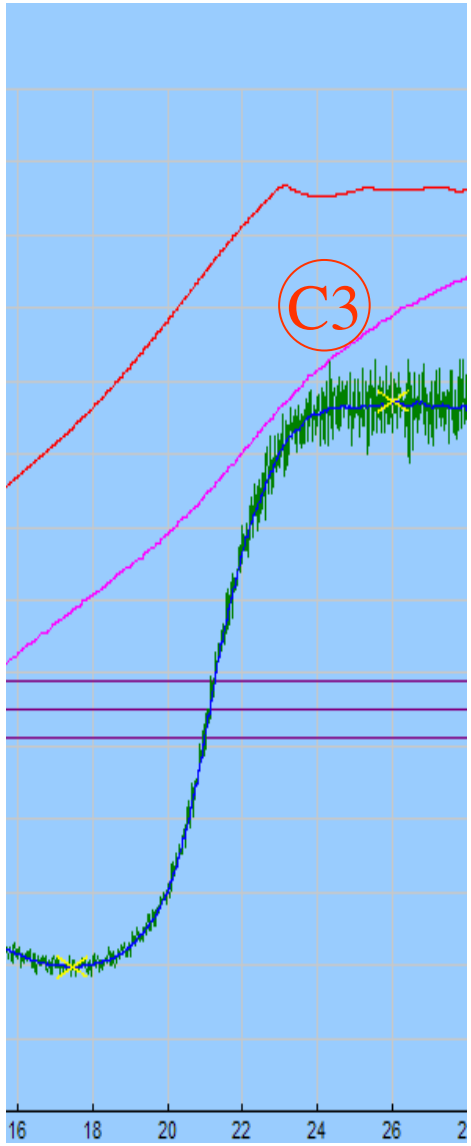


Starch behaviour

Peak torque (Nm): the maximum torque produced during the heating stage

The strongly bound crystalline areas of ordinary starch granules render them insoluble in cold water.

When heating, they will form an opaque suspension, then translucent (granules swell up and can burst, amylose and amylopectine get out of starch granules) and finally a viscous solution = Gelatinization



Starch behaviour

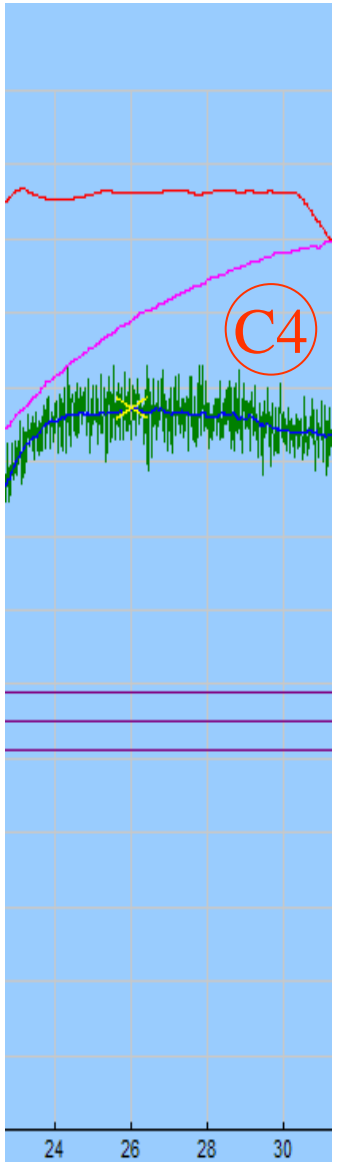
Cooking stability (Nm): ratio of the torque after the holding time at 90°C and the maximum torque during heating period

From the end of gelatinization, only one stress : mixing

-Starch +/- steady

-Amylose and Amylopectine are more free to catch water

-According to high temperature, Amylase & enzymes break the linkages : viscosity decreases



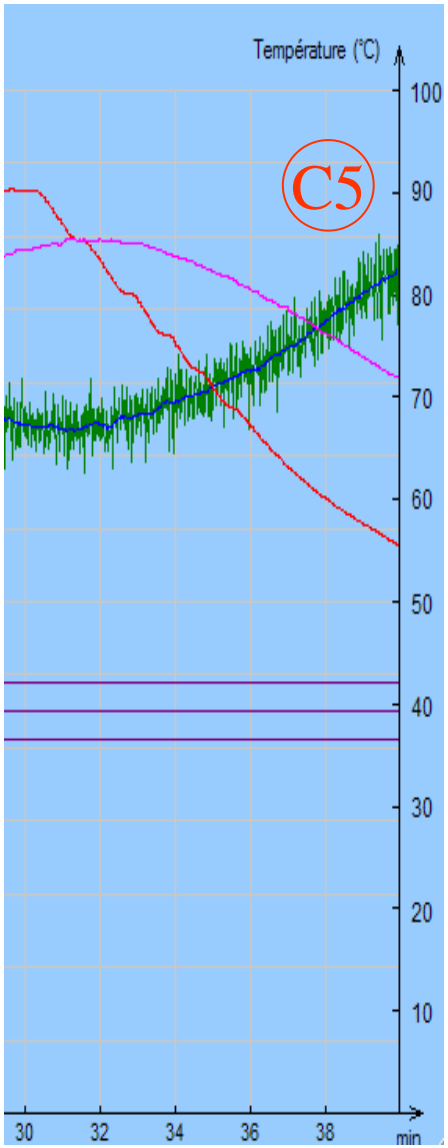
Starch behaviour

Setback (Nm): difference between the torque produced after cooling at 50°C and the one after the heating period

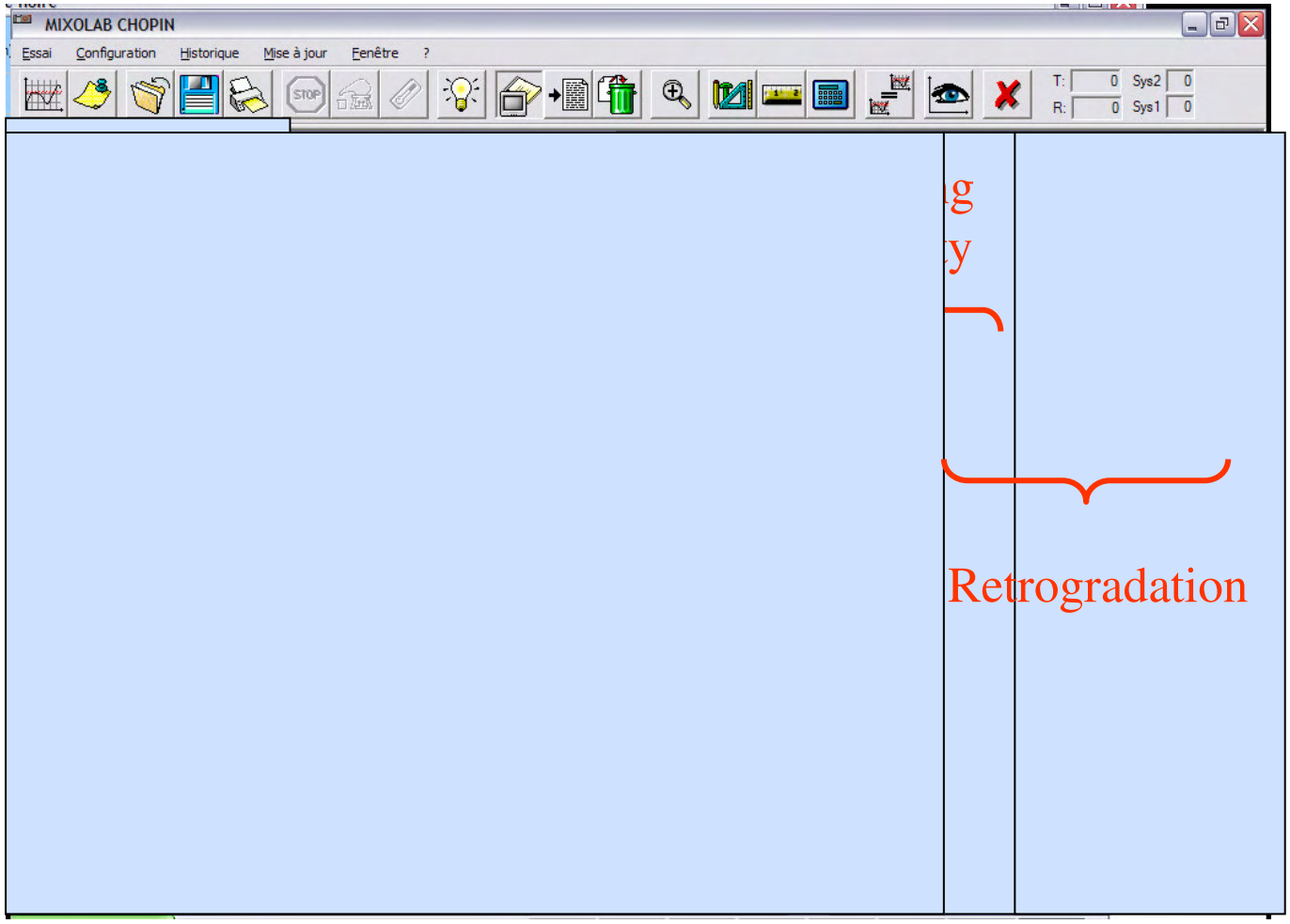
Gel causes the bread to deteriorate (staling)

Upon cooling : gelatinized amylose molecules begin to re-crystallize, network to form an ordered structure. They shrink as some of the liquid separates from the gel

= Retrogradation = crumbs firmness = staling



…to reach a complete information !



Summary

- The Mixolab is a new tool for a complete characterization of the sample :
  - Water absorption.
  - Dough tolerance, stability and elasticity.
  - Starch gelatinization and retrogradation.
  - Enzyme activity.
  - Mixing power

- Many settings and calculation possibilities.
- 50g sample.
- Standardized ICC 173

Summary

- Mixolab brings new testing possibility to the market :
  - Protein behaviour during heating (C2 in relation with volume).
  - Pasting properties measured on a dough instead of a batter.
  - Retro gradation in relation with product shelf life.
  - Complete testing with only 1 test.
  - Possibility to work on whole meal flour (time saving on sample preparation…).
- Various studies are under progress within a very active user group. More application to come up on different products (Durum wheat…) additives (Incl. Fibres, hydrocolloïds…), related to bread making…

Thank you very much for your attention

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