# Measuring starch damage in corn flours with the Chopin SDmatic

## Objective

The purpose of this study is to determine if it is possible to qualify different corn flours using an SDmatic.

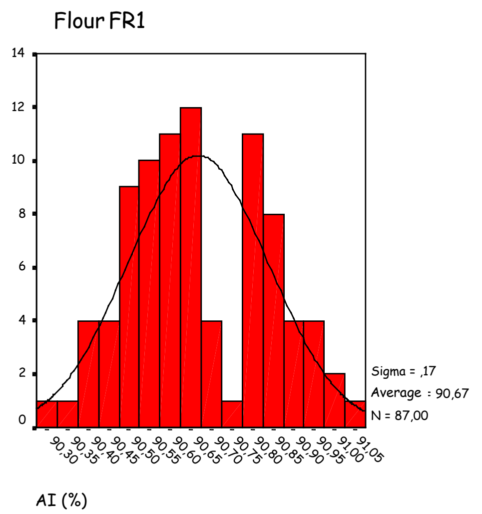
## Equipment and methods

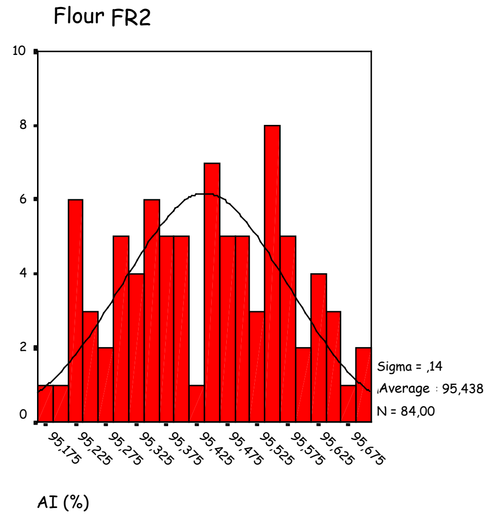
Chopin SDmatic :

- Principle

This device makes it possible to measure starch damage by using the amperometric method.
A solution is prepared with 120 ml of distilled water, 3 grams of potassium iodide, 3 grams of boric acid and a drop of sodium thiosulphate. After the iodine has been generated by the probe, 1 gram of flour is automatically introduced into the solution. The device measures the absorption of the iodine (AI %) which is in contact with the starch damage. The greater the iodine absorption the more starch damage there is.

- Results on wheat flour




Reproductibility of the method measured on 29 devices on two different flours.

Corn flours :

- Origin A corn :
  - « fine » milling A1
  - « average » milling A2
  - « rough » milling A3
- Origin B corn :
  - « fine » milling B1
  - « average » milling B2
  - « rough » milling B3
- Other corn milling :
  - Milling considered as being « good » C1
  - Milling described as being « problematical » C2
  - Milling « presumed to be problematical » : C3 to C6



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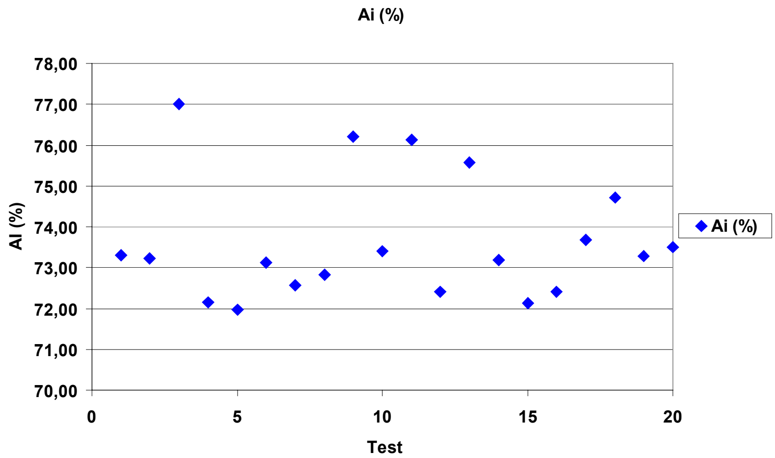
## Results and discussions

Repeatability measured on sample C1 :

| | Ai (%) |
|---|---|
| | 73.31 |
| | 73.23 |
| | 77 .01 |
| | 72.15 |
| | 71.97 |
| | 73.12 |
| | 72,57 |
| | 72.82 |
| | 76.20 |
| | 73.40 |
| | 76.12 |
| | 72.41 |
| | 75.57 |
| | 73.19 |
| | 72.12 |
| | 72,41 |
| | 73.68 |
| | 74.71 |
| | 73.28 |
| | 73.51 |
| average | 73.64 |
| Typical difference | 1.49 |




The average obtained in 20 tests carried out on sample C1 is 73.64% and the typical difference is ± 1.49. In comparison with results obtained on wheat flours, we note that starch damage is lower and that repeatability is not as good as on corn flours. These flours are more heterogeneous than wheat flours and contain peripheral parts of the grain.
Basing the results obtained on one sample and one device only, we consider that there is a significant difference between the results obtained on two samples when the difference in iodine absorption (absolute value) is higher 1.49.

Results obtained on 12 corn flour samples :

| | AI (%) |
|---|---|
| A1 | 79.95 |
| A2 | 78.68 |
| A3 | 73.43 |
| B1 | 84.39 |
| B2 | 76.20 |
| B3 | 70.17 |
| C1 | 73.27 |
| C2 | 79.46 |
| C3 | 76.75 |
| C4 | 79.19 |
| C5 | 74.60 |
| C6 | 89.90 |

Samples A1, A2, A3 come from the same corn but they have undergone a different transformation. Flour A1 has the most damaged starch followed by A2 then A3. Samples A1 and A2 are quite close (79.95% for A1 and 78.68% for A2), the third one stands out with an AI of 73.43%.

Samples B1, B2 and B3 come from the same corn but they have undergone a different transformation. Flour B1 has the highest damaged starch followed by B2 then B3. The differences obtained in these three tests are significantly different.

For corns A and B, the « fine » millings are the most damaged.

**Samples C1 to C6 have iodine absorptions between 73.27% for C1 and 89.90% for C6.**
**The sample considered as being « OK » has the lowest iodine absorption and therefore the lowest damaged starch.**
Flour C6 stands out from the rest with a high iodine absorption of 89.90%.

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## Conclusion

The results obtained with the SDmatic on these 12 corn flour samples provide indications as to the quality of these products. For the application considered, the “good” characteristic seems to be linked to a lower level of starch damage. It is therefore possible to use the SDmatic to characterize corn flours.



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