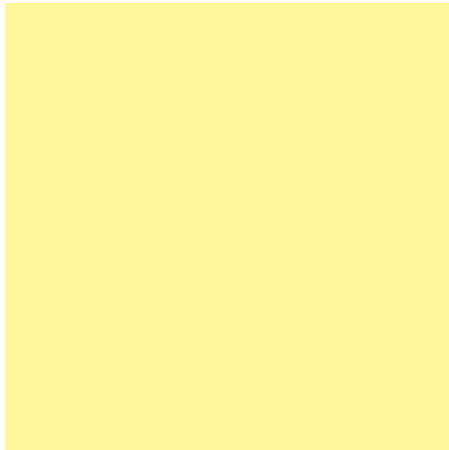


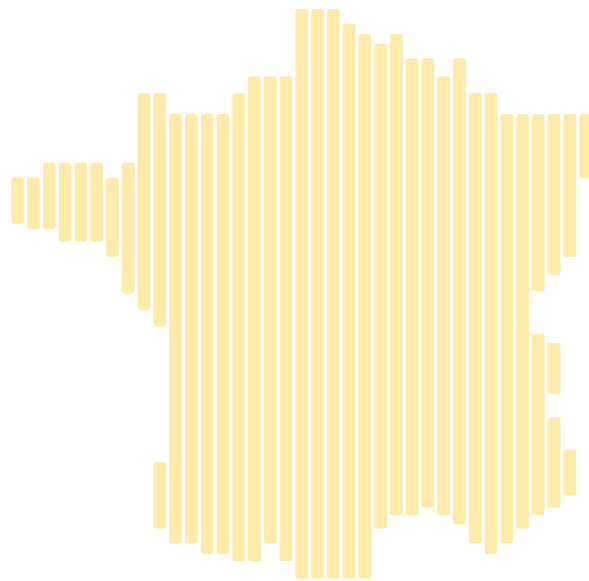
> PUBLICATION
October 2015

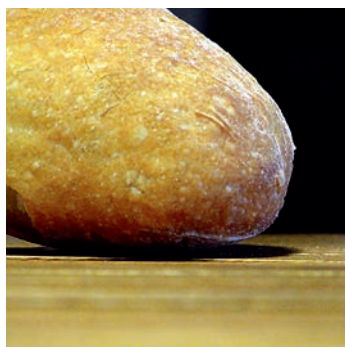
HARVEST 2015



Quality of French Wheat

AT DELIVERY TO INLAND COLLECTION SILOS





40.7

million tonnes of wheat
harvested in 2015
of which

19.6

million tonnes
of wheat from the "Premium"
and "Superior" categories

2015 HARVEST: A RECORD PRODUCTION OF OVER 40 MILLION TONNES AND A SATISFACTORY QUALITY



Thanks to climatic conditions that were, on the whole, very favourable during the development of the plants and notwithstanding the drought during filling, the yields were particularly high this year. In the end, the high temperatures at the end of June and the start of July only had a limited effect on the crops, due to their stage of development. Due to the combined effect of the yields and areas, France harvested 40.7 million tonnes of wheat. That's an increase of 8.6% compared to the previous harvest, therefore confirming its position as a regular producer and important supplier on international markets.

Quality overall is satisfactory and even very good as regards certain features.

Nearly half of the harvest fulfilled the criteria of the "Premium" and "Superior" categories of good flour-milling quality.

A record specific weight and a protein quality guaranteeing a good processing capability

On a national scale, the average protein content is 11%, with 49% of the wheat displaying a rate higher than 11%. The dilution effect was significant due to the very high yields. In certain production areas the last supply of nitrogen hasn't always been able to be used by the plants due to the lack of subsequent rain.

Although the lack of rain was able, in certain situations, to undermine the assimilation of nitrogen, it was however favourable to the other criteria. The specific weights, the potential of which was very high at the start of filling thanks to a very good sunshine rate, were very good once harvested. They reached 79.6kg/hl on average, a sharp increase compared to 2014. Nearly all the wheat (99%) therefore exceeded the threshold of 76kg/hl.

Moreover, thanks to the generally dry climate during harvesting, the Hagberg falling indicators were very good: 98% of wheat exceeded 220 seconds. The water content of grain, especially low this year, was 12.8% on average at the time of delivery to collection silos.

Regarding technological quality, baking strength was on average 173. The doughs had a P/L of 0.98 on average. Almost 57% of wheat showed a P/L of less than 1. Lastly, the baking quality should respond to the majority of bread-making uses, with good dough results, a good bread-making behaviour and good-looking bread. Combined with other sources or used as it is, French wheat will therefore be able to satisfy the full range of its traditional markets.

19.6 million tonnes qualified as "Premium" and "Superior" category wheat

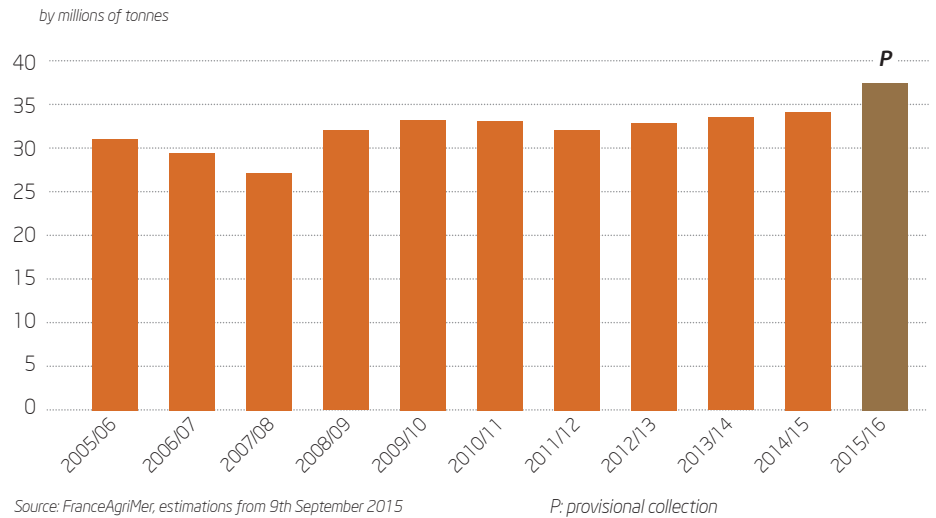
The French cereals sector has, for many years, strived to offer a high quality of production. 94% of crop growing areas are cultivated with various bread-making varieties of wheat which display complementary technological characteristics. In 2015, 19.6 million tonnes were quality milling wheat belonging to the "Premium" and "Superior" categories, with protein rates higher than 11%, a specific weight higher than 76kg/hl and a Hagberg Falling Number exceeding 220 seconds. 17% of the 40.7 million tonnes of wheat weren't useable for milling, with a protein rate less than 10.5%. This harvest will be able to respond to the demands of all French customers, both on the national market and the export markets.

COLLECTION LEVEL



NATIONAL WHEAT COLLECTION TRENDS

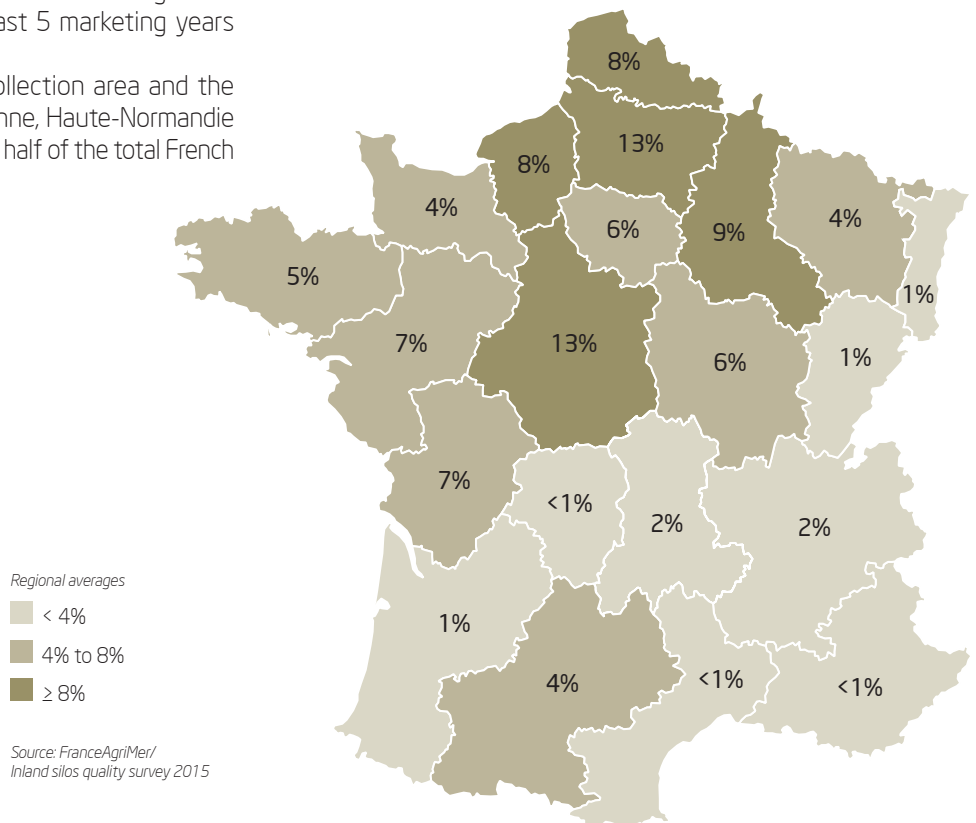
> The collection, strictly speaking, represents the share of the harvest that is not used for on-farm consumption and consequently is marketed by the producers. Over the last five campaigns, the national harvest has stayed at a high level, between 31.7 and 33.7 million tonnes. This regularity provides the sector with a definite advantage. Estimated at 37.3 million tonnes, the 2015/16 collection is the highest of the last ten campaigns.



AVERAGED COLLECTION OVER THE PAST FIVE CAMPAIGNS

> The map opposite shows the contribution of each region to the national collection averaged over the last 5 marketing years (2010/2011 to 2014/2015). The Northern half of France is the main collection area and the regions of Picardie, Centre, Champagne-Ardenne, Haute-Normandie and Nord-Pas-de-Calais account for a little over half of the total French collection.

33 million tonnes
on average collected over
the last 5 campaigns



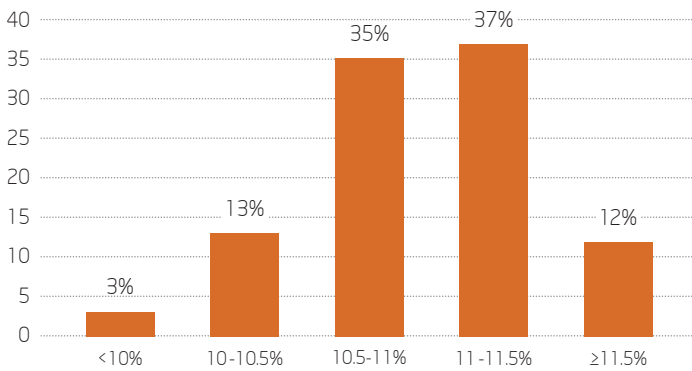
PROTEIN AND SPECIFIC WEIGHTS



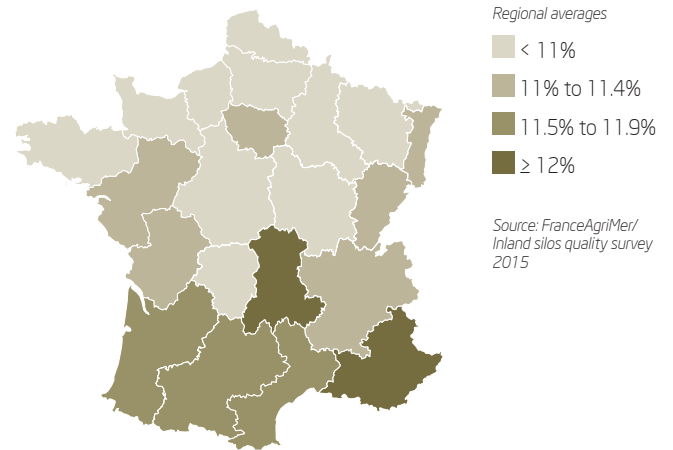
AN AVERAGE PROTEIN CONTENT OF 11%

> In 2015, the protein rate reached 11% on average, mainly due to the dilution effect linked to the high yield levels. Furthermore, due to the lack of rain right after the last supply, the nitrogen assimilation may have been insufficient in certain production areas. The regional averages range from 10.5% to 13.3%, with a North-South gradient. In total, 49% of wheat reach a protein content of over 11%.

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015



Source: FranceAgriMer/
Inland silos quality survey
2015

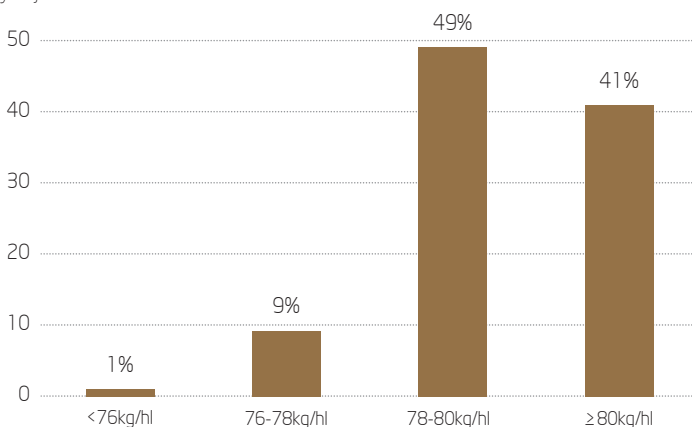
49% of wheat show a protein content of over **11%**

SPECIFIC WEIGHTS AT RECORD LEVELS

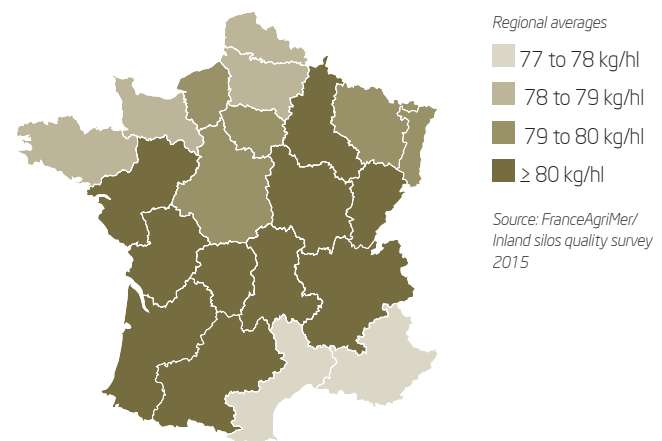
> The lack of rain up until the harvest has preserved the high specific weight potential implemented at the start of the filling thanks to a good sunshine rate. In this context, the specific weights have reached record levels, with 90% of the harvest exceeding the 78kg/hl.

With 79.6kg/hl on average, the 2015/2016 season is one of the best over the last twenty years.

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015



Source: FranceAgriMer/
Inland silos quality survey
2015

90% of the French harvest exceeds **78kg/hl**

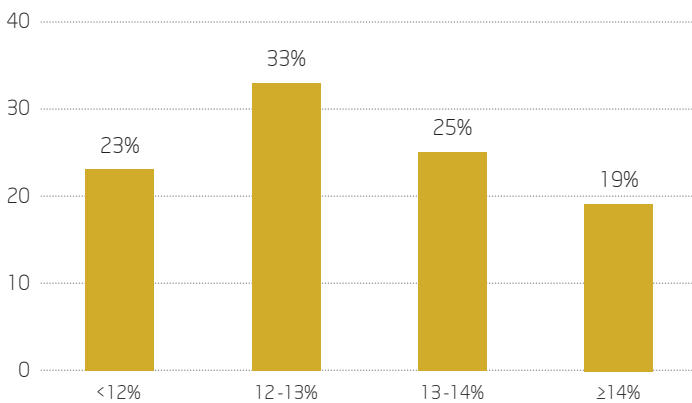
WATER CONTENT AND HAGBERG



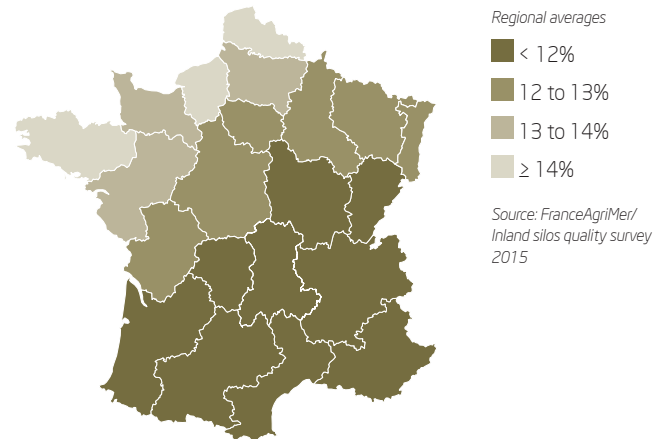
PARTICULARLY LOW WATER CONTENTS

> The end of the cycle took place under dry conditions until the harvest. The water content of the grains at the time of delivery to collection silos was particularly low this year at 12.8% on average. The regions on the Channel coast have the highest values, without, however, exceeding 14.1% humidity on average. On a national scale, 81% of the harvest had a water content of less than 14%, and 23% of it is below 12%.

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015



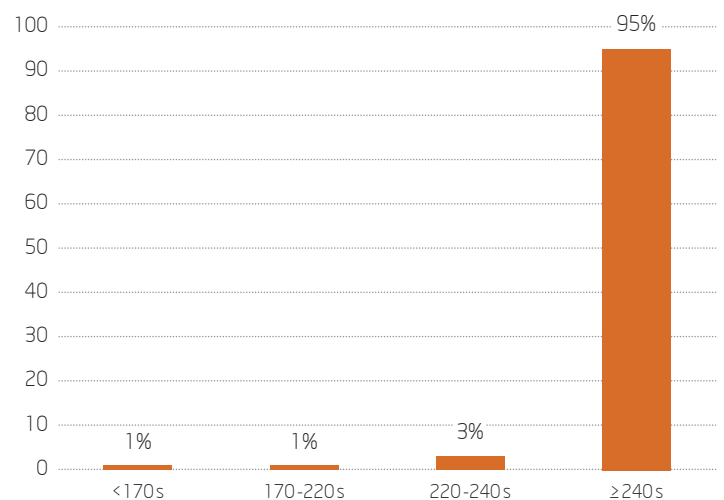
Water content of
12.8%
on average

HIGH HAGBERG NUMBERS SHOW A LACK OF GERMINATION

> The Hagberg Falling Numbers displayed a very high level over the whole country due to the lack of rain during the grain filling and maturation stages. In the end, 95% of the harvest exceeded 240 seconds and only 1% of the harvest was below 170 seconds.

95% of wheat
above **240s**

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

HARDNESS AND GLUTEN



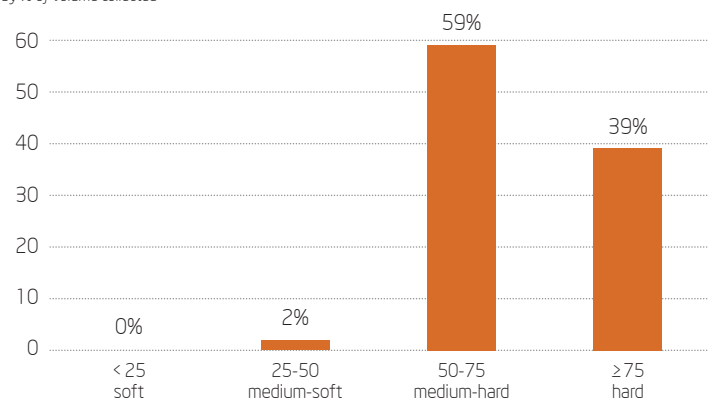
HARDNESS: MEDIUM-HARD TO HARD WHEAT

> For over 15 years, French wheat has been mainly medium-hard to hard as a consequence of varietal evolution. With favourable conditions at the end of the cycle, the genetic potential of French wheat has clearly appeared. The 2015 average hardness was 73 and 98% of the collection was above 50.

98%
of superior wheat
at 50

Hardness

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

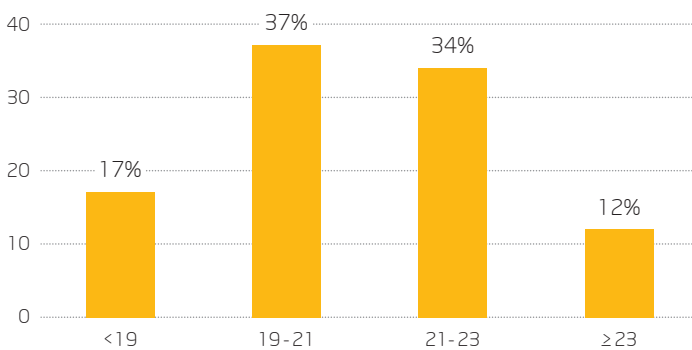
A GOOD QUALITY GLUTEN

> The wet gluten content of the wheat was 20.7% on average, in relation with the protein content.

> The gluten index, the indicator of the quality of the proteins, was 83 on average. Over two thirds of the harvest had a gluten index greater than 80, demonstrating a good gluten viscoelasticity, which, in terms of quality, largely compensates for the low wet gluten content.

Wet gluten

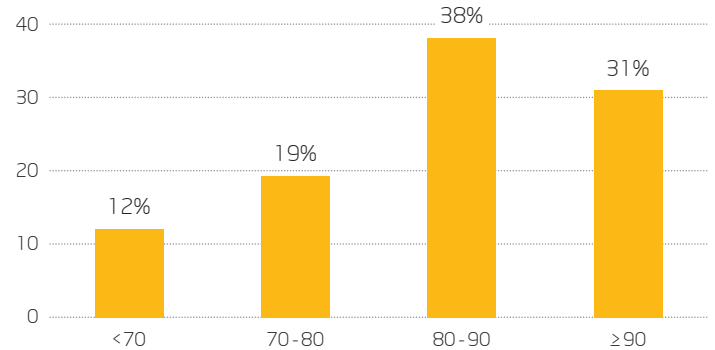
by % of volume collected



Source: FranceAgriMer/ARVALIS - Institut du végétal/ Inland silos quality survey 2015

Gluten Index

by % of volume collected



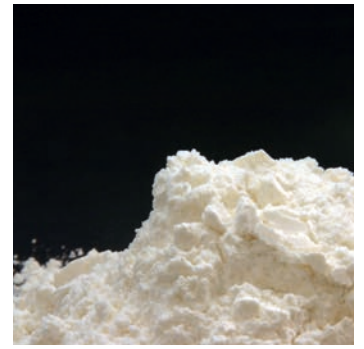
Source: FranceAgriMer/ARVALIS - Institut du végétal/ Inland silos quality survey 2015



ACCREDITATION
NO. 1-0741 MADE
AVAILABLE AT
WWW.COFRAC.FR

Analyses of the wet gluten content and the gluten Index, conducted by the Pôle Analytique d'ARVALIS, are covered by Cofrac accreditation no. 1-0741.

ALVEOGRAPHIC CRITERIA



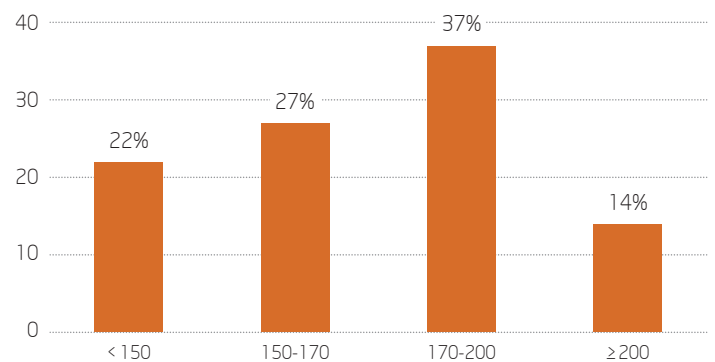
A BAKING STRENGTH OF 173 ON AVERAGE

> The baking strength (W) of wheat is 173 on average. 63% of the wheat is above 160 W and a little over half is above 170, which confirms the improved gluten quality.

51%
of superior wheat
at 170 W

Baking strength (W)

by % of volume collected



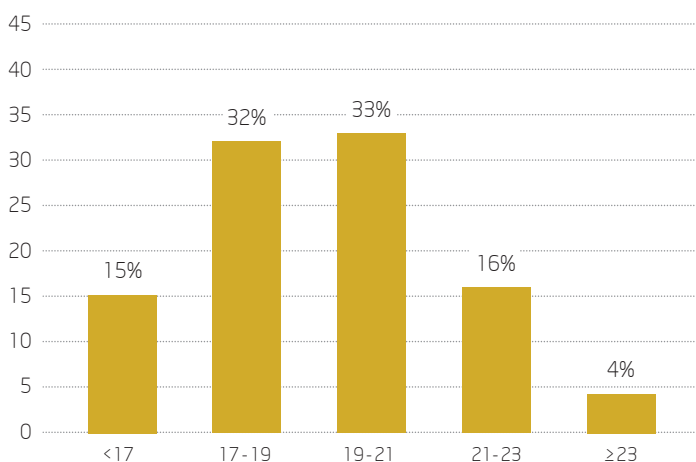
Source: FranceAgriMer/Inland silos quality survey 2015

G AND P COEFFICIENTS: A WIDE RANGE OF EXTENSIBILITY AND TENACITY

> The rising index (G) and the tenacity parameter (P) are spread over a large range of values capable of responding to the various requirements of end users. On average, the G coefficient is 19.2 and the P coefficient is 70.

G

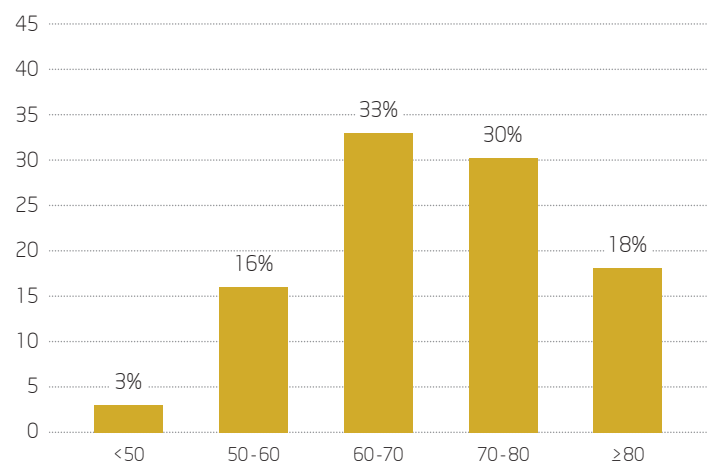
by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

P

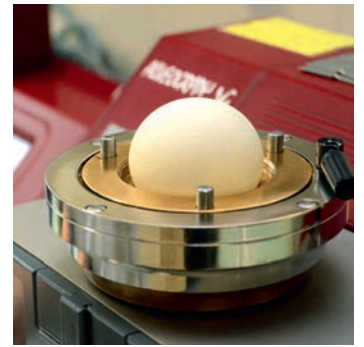
by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

Chopin alveograph measurements were taken on wheat with at least 10.3% protein and 170 seconds for the Hagberg Falling number value.

ALVEOGRAPHIC CRITERIA



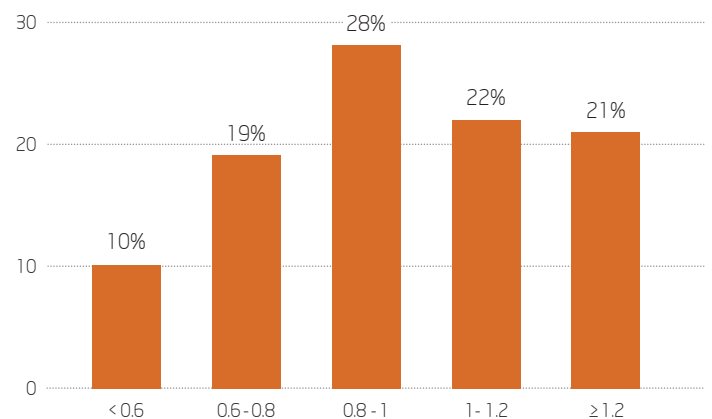
A DIVERSIFIED RANGE OF P/L AROUND AN AVERAGE OF 0.98

> In relation to the G and P parameters, the P/L cover a range of values allowing for a response to the varying needs of French and foreign customers. The average was set at 0.98. Almost 57% of wheat showed a P/L of less than 1.

P/L:
57%
 of wheat are less than 1

P/L

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

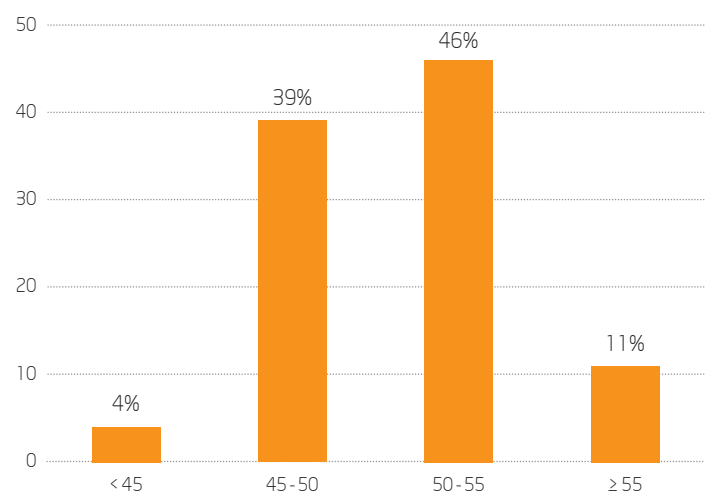
ELASTICITY INDEXES EQUAL TO TENACITY ONES.

> The elasticity index (Ie) of the wheat reached 51 on average. The majority of the collection stands between 50 and 55, corresponding to a more balanced dough during the shaping in the bread-making process. 11% of the wheat produce a tenacious dough. Few wheat had a low elasticity index.

85%
 of the harvest with a balanced elasticity index

Elasticity index

by % of volume collected



Source: FranceAgriMer/Inland silos quality survey 2015

Chopin alveograph measurements were taken on wheat with at least 10.3% protein and 170 seconds for the Hagberg falling number value.

BAKING VALUE

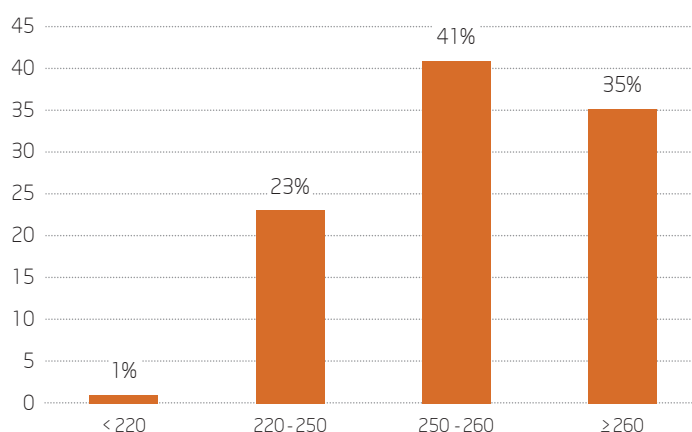


A CONSISTENTLY SATISFACTORY BAKING QUALITY

> According to the standard French bread-making test, 76% of the wheat samples demonstrated a good baking quality. That was despite protein rates that were sometimes limited, but compensated for by the improvement in the quality of the proteins from new varieties. The average total bread-making grading was around 254 out of 300. 23% of wheat analysed had an intermediate baking value. Only 1% of the wheat analysed were considered as unsuitable for bread-making.

Total bread-making grading out of 300

by % of volume collected

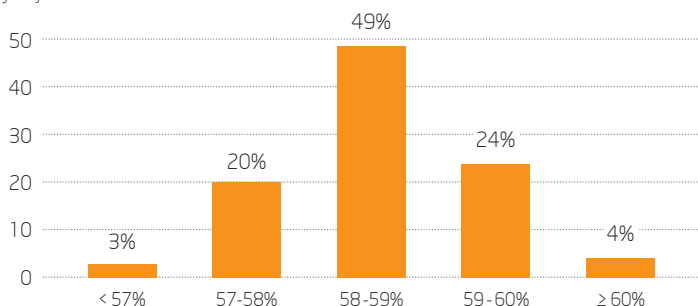


Source: FranceAgriMer/ARVALIS - Institut du végétal / Inland silos quality survey 2015

BREAD-MAKING CHARACTERISTICS

Water absorption

by % of volume collected



Source: FranceAgriMer/ARVALIS - Institut du végétal / Inland silos quality survey 2015

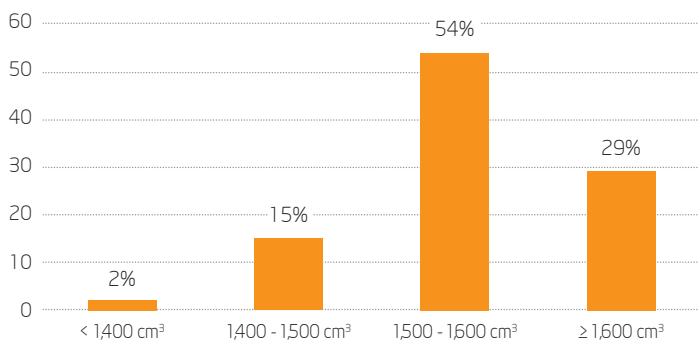
> Water absorption during kneading was satisfactory this year, with an average of 58.5%. Nearly 73% of the wheat had a water absorption between 58 and 60% and 28% of the wheat had a water absorption higher than 59%.

During shaping, the doughs are well balanced most of the time - neither too extensible nor too elastic. The shape preservation during baking also is very good. These two elements convey to good dough notes.

The bread results are also of a good level, with well-developed scoring marks. The volumes are average at 1,560 cm³ on average. 83% of the wheat analysed has a volume higher than 1,500 cm³ including 29% with a volume higher than 1,600 cm³. All the other criteria were higher than average and the overall result remains good.

Volumes

by % of volume collected



Source: FranceAgriMer/ARVALIS - Institut du végétal / Inland silos quality survey 2015

This demanding test, reflecting the main stages of the bread-making process, can be transposed to many other processes. The features revealed show that French wheat is, in most situations, able to satisfy the needs of end users.

The standard French bread-making test, conducted by the Pôle Analytique d'ARVALIS, is covered by Cofrac accreditation no. 1-0741.



CLASSIFICATION OF WHEAT



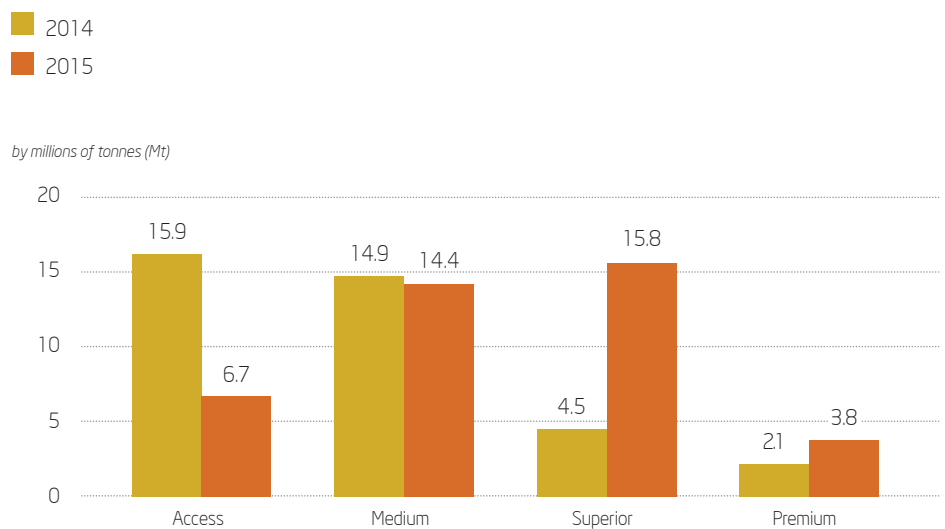
34 MT OF PREMIUM, SUPERIOR AND MEDIUM CATEGORY WHEAT

> The protein rate, baking strength (W), mass per hectolitre and Hagberg falling number value parameters allow the collected wheat to be positioned within four quality categories.

This overview of the harvest depicts the French "average resource". On top of that, the diversity in the hinterland leaves the room for the segregation and blending ability of the various operators, which allows a better matching to customers' expectations.

In 2015, 34 million tonnes were Premium, Superior and Medium wheat. 19.6 million tonnes were Premium and Superior category, with a protein rate higher than 11%, a specific weight higher than 76 and a Hagberg falling number exceeding 220 seconds.

19.6
million tonnes come
from the categories:
**Premium
and Superior**



Source: FranceAgriMer, assessment of the harvest on 9th September 2015/Inland silos quality survey 2015

CLASSIFICATION TABLE

Categories	Protein	W	Specific weight	Hagberg falling number value	National breakdown
Premium	> 11.5%	> 170	> 77	> 240	9%
Superior	> 11%	not specified	> 76	> 220*	39%
Medium	> 10.5%	not specified	not specified	> 170*	35%
Access	specified in the contract	not specified	not specified	not specified	17%

Protein: (N x 5.7) % M.S.
W: 10-4 joules/g
Hagberg: Seconds

PS: kg/hl
sc: specified in the contract
ns: not specified

* The Superior and Medium categories can be used without a Hagberg specification and in this case, the labels are "Superior" and "Medium"

Source: FranceAgriMer/Inland silos quality survey 2015

A SURVEY PERFORMED AT INLAND COLLECTION SILOS

The *Quality of French Wheat* survey is conducted by FranceAgriMer and ARVALIS - Institut du végétal, with the support of Intercéréales, the Association Nationale de la Meunerie Française (ANMF) and the Groupement National Interprofessionnel des Semences et Plants (GNIS).

The aim of the survey is to provide information on the quality of wheat harvested in 267 silos belonging to storage organisations, cooperatives and private merchants. At the time of the harvest, approximately 590 samples were taken by FranceAgriMer agents during delivery from farms to inland collection silos. Such samples are representative of the different sorting classes set up by the concerned inland collection silo. Then the samples are sent to the laboratories of FranceAgriMer and ARVALIS- Institut du végétal for analysis. Depending on the type of analysis, either all the samples, or a subset of them representing however the vast majority of the collected wheat of that site, were analysed.

ANALYTICAL METHODS

> Protein content - 589 samples

The protein content is measured on whole grains by near infra-red spectroscopy.

It is calculated by using coefficient 5.7 and refers to dry matter (DM).

> Mass per hectolitre or specific weight (NF EN ISO 7971-3) - 589 samples

It is obtained with a Niléma-litre and expressed in kg/hl on the sample as is.

Since 1st July 2012, the results obtained have then been corrected using the following equation: $(0.9078 \times \text{mass per hectolitre}) + 6.6025$.

> Water content - 589 samples

The water content is measured on whole grains by near infra-red spectroscopy.

> Hagberg-Perten falling number value (NF EN ISO 3093) - 589 samples

This indirectly measures the level of alpha-amylase activity, which can become excessive due to the presence of grain which has germinated or is in the process of germinating. The falling number is expressed in seconds and corresponds to the time it takes a stylet to reach the bottom of a tube containing a mixture of milled wheat and water, immersed in a bath of boiling water. A short duration means high amylase activity and therefore a potentially degraded quality.

> Hardness index (AACC 3970.A) - 589 samples

The hardness, or state of cohesion of the grain, is measured by near infra-red reflectance spectroscopy. The different classes

of hardness (extra-soft, soft, medium-soft, medium-hard, hard and extra-hard) are expressed by an index on a continuous scale graduated from 0 to 100. By general standards, index 25 corresponds to the average value of wheat and index 75 corresponds to hard wheat.

> Wet gluten content and gluten Index (ICC 155) - 202 samples

These values are used to assess:

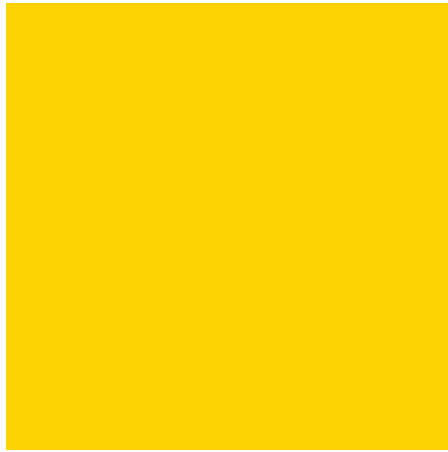
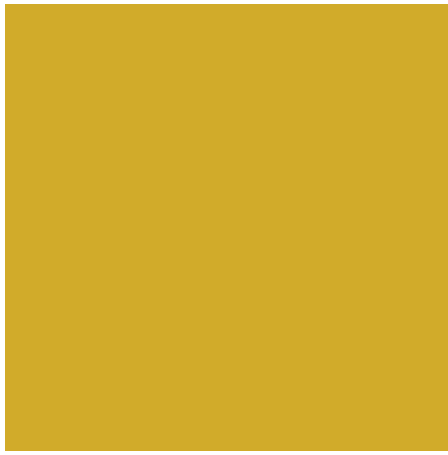
- the quantity of gluten extracted by mechanically kneading and washing a mixture of milled wheat and salted water,
- the viscoelastic quality of gluten by centrifugation through a sieve, the higher the index, the more tenacious the gluten.

> The CHOPIN alveograph test (NF EN ISO 27971) - 496 samples

The alveograph test is performed on flour taken from a milled wheat sample, for samples whose protein content is above 10.3% and the Hagberg falling number is higher than 170s. The CHOPIN alveograph tests weren't carried out on wheat classed as "fodder" by the harvesters. The measure is based on the recording of rheological behaviour of a disc of dough undergoing deformation in the form of a bubble. Five parameters are assessed: W, G, P, P/L and le. W represents the deformation of the dough. It gives a good indication of the baking strength. G, or rising index, represents the extensibility of the dough. P relates to the tenacity of the dough. The P/L ratio provides a measurement of the balance between tenacity and extensibility. Finally, the 'le' parameter expresses the elasticity of the dough.

> Standard French bread-making test (NF V03-716) - 50 samples

The bread-making test is conducted on the flour from a milled wheat sample and on 50 representative samples of the collection. It is conducted in five stages: kneading, first fermentation, shaping, second fermentation and finally baking of the breads. Baking quality is assessed at each stage of the bread-making process and leads to a grade out of 300. It summarises 30 intermediary grades established by the baker for evaluating the characteristics of the dough, the bread as a whole and its soft centre. A bread-making grade which is lower than 200 indicates that the wheat is poorly adapted to French bread-making. On the other hand, a grade higher than 250 testifies to the dough's good bread-making quality.



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Association nationale de la meunerie française (ANMF)
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Groupement national interprofessionnel des semences et plants (Gnis)
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