Quality Report
2016/2017 Season

# South African Wheat Crop

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# South African
# COMMERCIAL WHEAT QUALITY FOR THE 2016/2017 SEASON

**Acknowledgements**

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- Milling companies for providing samples of wheat delivered directly to the mills.
- The Crop Estimates Committee (CEC) of the Department of Agriculture, Forestry and Fisheries (DAFF) for providing production related figures.
- South African Grain Information Service (SAGIS) for providing supply and demand figures relating to wheat and wheat products.

## Summary

The commercial wheat crop of the 2016/2017 season was set at 1.910 million tons which is 470 000 tons (32.6%) higher than the previous season's crop. A total area of 508 365 hectares was utilized for wheat production and the average yield was 3.76 tons per hectare (Figures obtained from the CEC).

The whole wheat protein average of 12.0% decreased by 0.8% compared to the previous season, the ten year national average is 11.8%. The percentage of samples having protein contents higher than 12.0% decreased from 68.2% last season to 47.8%, in the 2014/2015 season the percentage was 45.5%. The average hectolitre mass was 81.5 kg/hl, slightly higher than the 81.1 kg/hl of the 2015/2016 season. The hectoliter mass of only 3.9% of the samples was below the minimum Grade 1 requirement of 77 kg/hl.

The average falling number this season was 356 seconds. Four of the samples analysed gave falling number values below 250 seconds and of these two were below 220 seconds. The average mixogram peak time of 2.7 minutes was equal to the previous season and lower than the ten year average of 2.9 minutes.

## Introduction

This report provides the results of the nineteenth annual wheat crop quality survey performed by the Southern African Grain Laboratory NPC (SAGL). SAGL was established in 1997 on request of the Grain Industry. SAGL is an ISO 17025 accredited testing laboratory and participates in a number of proficiency testing schemes, both nationally and internationally as part of our ongoing quality assurance procedures to demonstrate technical competency and international comparability.

During the harvesting season (October to December for the southern production regions and November to January for the Northern production regions), a representative sample of each delivery of wheat was taken according to the prescribed wheat regulation.

A sub-sample of each of these grading samples was collected in a bin according to grade and class per silo bin at each silo. This composite bin sample was then divided and a 3 kg sample was sent to SAGL for the annual wheat crop quality survey. SAGL analysed 337 samples to provide as best possible a proportional representation of the production of wheat in all the different production regions.

Cultivar identification was performed on these samples and sales figures of seed sold by the commercial grain silo owners were requested. The samples were graded and the thousand kernel mass determined. Sub-samples were milled on a Quadromat Junior mill for mixograph analyses.

Composite samples were made up per class and grade for each production region and milled on a Bühler MLU 202 laboratory mill. Moisture, protein, ash and colour were determined and RVA analyses conducted. Rheological tests, namely gluten, mixogram, farinogram, alveogram, extensogram and 100-gram baking tests, were then performed.

The results (as averages per region) are made available weekly on the SAGL website (www.sagl.co.za) as soon as the first samples are received. The hard copy reports are distributed to all Directly Affected Groups and interested parties and are also available for download in a PDF format from the website.

In addition to the quality information compared over a number of seasons, production figures (obtained from the CEC) relating to hectares planted, tons produced and yields obtained on a national as well as provincial basis, over a ten season period, are provided in this report.

SAGIS supply and demand information over several seasons is presented in table and graph format. Information with regards to the manufacture, import and export of wheat products as well as the manufacture of pan baked products is also incorporated into the report.

Data on wheat imported for domestic use during the 2015/2016 (previous) season is included and compared to the quality of the local corresponding crop.

The national bread wheat grading regulations as published in the Government Gazette of 29 January 2016 are provided as the last section of the report.

The goal of this crop quality survey is to accumulate quality data on the commercial wheat crop on a national level. This valuable data reveals general tendencies and highlights quality differences in the commercial wheat produced in different local production regions. A detailed database containing reliable analytical data collected over several seasons is essential to enable industry to comment on proposed legislative levels and to supply reliable data for targeted research projects.

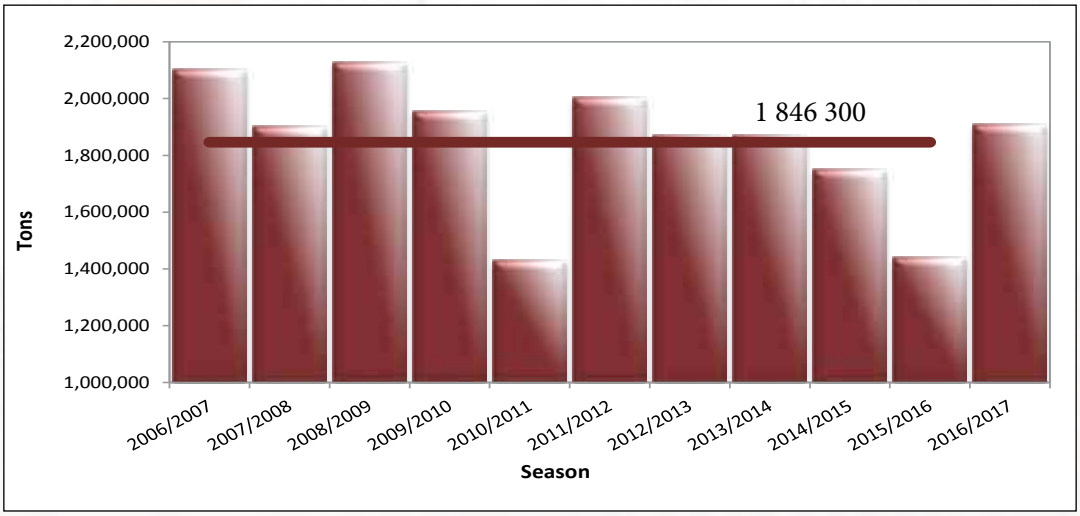
## Production

Wheat contributed 81% to the total winter cereal crop production in South Africa this season. Other winter crops produced are malting barley and canola.

South Africa (comprising nine provinces) is divided into 36 crop production regions with wheat planted in approximately 28 of these regions. Please see Figure 1 (RSA Provincial map) and Figure 2 (RSA Crop Production Regional map) on pages 28 and 29.

The national CEC's estimated total production figures were revised, using as basis for the calculations, SAGIS' published figures of actual deliveries. Figures to determine on-farm usage and retentions obtained from a wheat utilization survey conducted by DAFF, were added to the SAGIS delivery figures to calculate the final crop production figures.

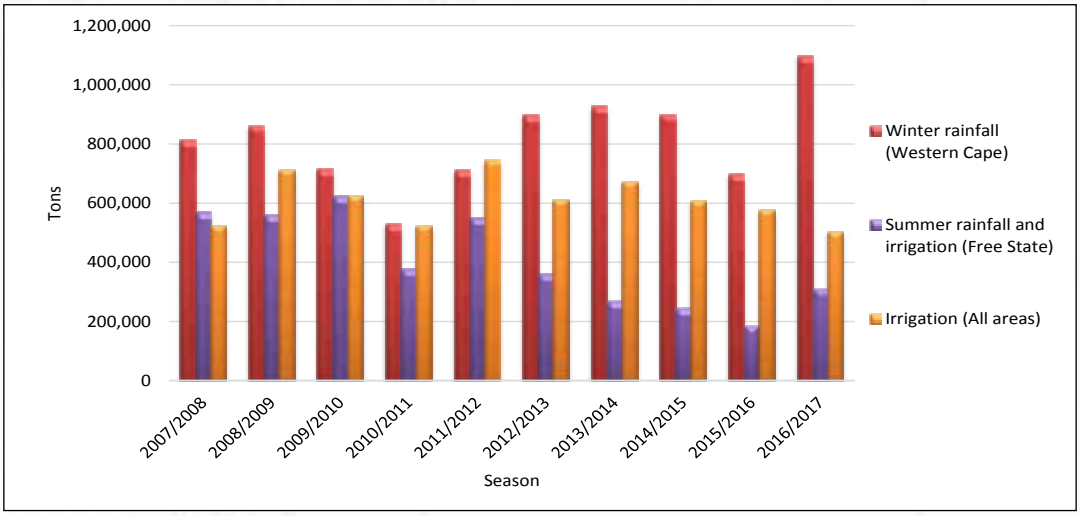
### Graph 1: Wheat production in the RSA from the 2006/2007 to 2016/2017 seasons




Figures provided by the CEC.

The final production figure of 1 910 000 tons is 3.5% higher than the ten year production average of 1 846 300 tons (2006/2007 to 2015/2016 seasons). The Western Cape produced 1 098 200 tons of wheat this season, contributing 57.5% of the total crop. The Free State's wheat production (308 460 tons) was the highest of the last four seasons and 131 960 tons higher than the previous season. This figure was also the second highest nationally. The irrigation areas of the Northern Cape, the third largest wheat producing area this season, produced 266 000 tons, 6 800 tons more than last season. The remainder of the wheat was produced in mainly Limpopo with 103 700 tons, representing a decline of 28% compared to the 2015/2016 season and North West, where production decreased by 18.6% to 69 600 tons. Please see Graphs 1 and 2.

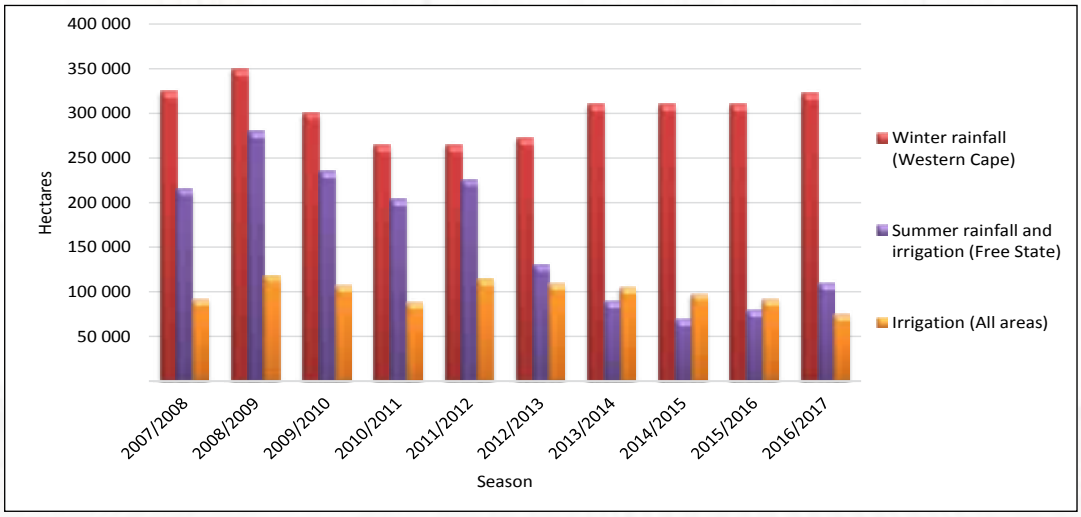
## Graph 2: Wheat production figures per production area over seasons




Figures provided by the CEC.

The area utilized for wheat production increased by 5.4% to 508 365 hectares from 482 150 hectares in the previous season, see Graph 3. The Free State, where plantings increased with 30 000 hectares compared to the previous season, was the main contributor to this increase.

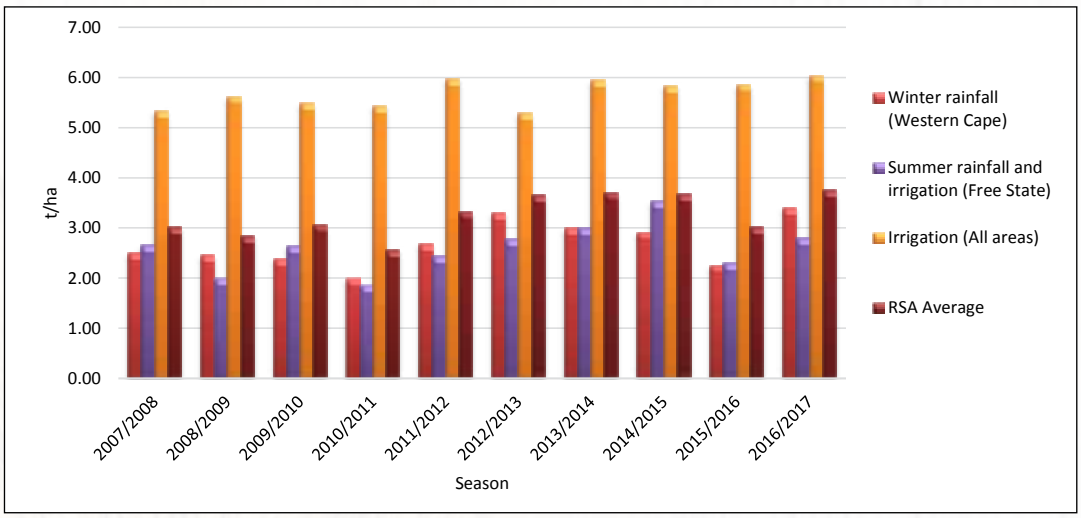
## Graph 3: Area planted per production area over seasons




Figures provided by the CEC.

The yield in the main production areas ranged from 2.80 tons per hectare (t/ha) in the primarily summer rainfall area (Free State) to 7.60 t/ha for irrigation wheat produced in the Northern Cape. The national yield average increased from 2.99 t/ha in the previous season to 3.76 t/ha. This is the highest average yield over the nineteen seasons that this particular survey has been conducted. Please refer to Graph 4.

## Graph 4: Average yield per production area over seasons




Figures provided by the CEC.

Table 1 provides an overview of the dry land versus irrigation wheat production in the 2016/2017 season, compared to the 2015/2016 season.

## Table1: Wheat production overview over two seasons

| Province | Type of production | 2015/2016 | | | 2016/2017 | | |
|---|---|---|---|---|---|---|---|
| | | Hectares planted, ha | Production, tons | Yield, t/ha | Hectares planted, ha | Production, tons | Yield, t/ha |
| Western Cape | Dryland | 305 500 | 680 500 | 2.23 | 315 000 | 1 055 700 | 3.35 |
| | Irrigation | 4 500 | 17 000 | 3.78 | 8 000 | 42 500 | 5.31 |
| | Total | 310 000 | 697 500 | 2.25 | 323 000 | 1 098 200 | 3.40 |
| Northern Cape | Dryland | 1 000 | 600 | 0.60 | 1 000 | 1 000 | 1.00 |
| | Irrigation | 35 000 | 258 600 | 7.39 | 34 000 | 265 000 | 7.79 |
| | Total | 36 000 | 259 200 | 7.20 | 35 000 | 266 000 | 7.60 |
| Free State | Dryland | 55 500 | 60 000 | 1.08 | 86 000 | 184 000 | 2.14 |
| | Irrigation | 24 500 | 116 500 | 4.76 | 24 000 | 124 460 | 5.19 |
| | Total | 80 000 | 176 500 | 2.21 | 110 000 | 308 460 | 2.80 |
| Eastern Cape | Dryland | 1 033 | 1 860 | 1.80 | 700 | 1 700 | 2.43 |
| | Irrigation | 2 067 | 13 020 | 6.30 | 1 500 | 9 300 | 6.20 |
| | Total | 3 100 | 14 880 | 4.80 | 2 200 | 11 000 | 5.00 |
| KwaZulu-Natal | Dryland | | | | | | |
| | Irrigation | 7 300 | 41 000 | 5.62 | 6 500 | 37 050 | 5.70 |
| | Total | 7 300 | 41 000 | 5.62 | 6 500 | 37 050 | 5.70 |
| Mpumalanga | Dryland | | | | 300 | 900 | 3.00 |
| | Irrigation | 3 500 | 19 500 | 5.57 | 2 000 | 12 900 | 6.45 |
| | Total | 3 500 | 19 500 | 5.57 | 2 300 | 13 800 | 6.00 |
| Limpopo | Dryland | 1 500 | 1 020 | 0.68 | 850 | 2 000 | 2.35 |
| | Irrigation | 25 500 | 143 400 | 5.62 | 16 150 | 101 700 | 6.30 |
| | Total | 27 000 | 144 420 | 5.35 | 17 000 | 103 700 | 6.10 |
| Gauteng | Dryland | 50 | 100 | 2.00 | 30 | 70 | 2.33 |
| | Irrigation | 200 | 1 400 | 7.00 | 335 | 2 120 | 6.33 |
| | Total | 250 | 1 500 | 6.00 | 365 | 2 190 | 6.00 |
| North West | Dryland | 570 | 950 | 1.67 | 80 | 200 | 2.50 |
| | Irrigation | 14 430 | 84 550 | 5.86 | 11 920 | 69 400 | 5.80 |
| | Total | 15 000 | 85 500 | 5.70 | 12 000 | 69 600 | 5.80 |
| RSA | Dryland | 365 153 | 745 030 | 2.04 | 403 960 | 1 245 570 | 3.08 |
| | Irrigation | 116 997 | 694 970 | 5.94 | 104 405 | 664 430 | 6.36 |
| | Total | 482 150 | 1 440 000 | 2.99 | 508 365 | 1 910 000 | 3.76 |

Figures provided by the CEC.

## Supply and Demand

World wheat production for the 2016/2017 season is estimated at 754.10 million metric tons according to the *World Agricultural Supply and Demand Estimates (WASDE) report 566 of 9 June 2017*, world production for 2017/2018 is projected to be 739.53 million metric tons.

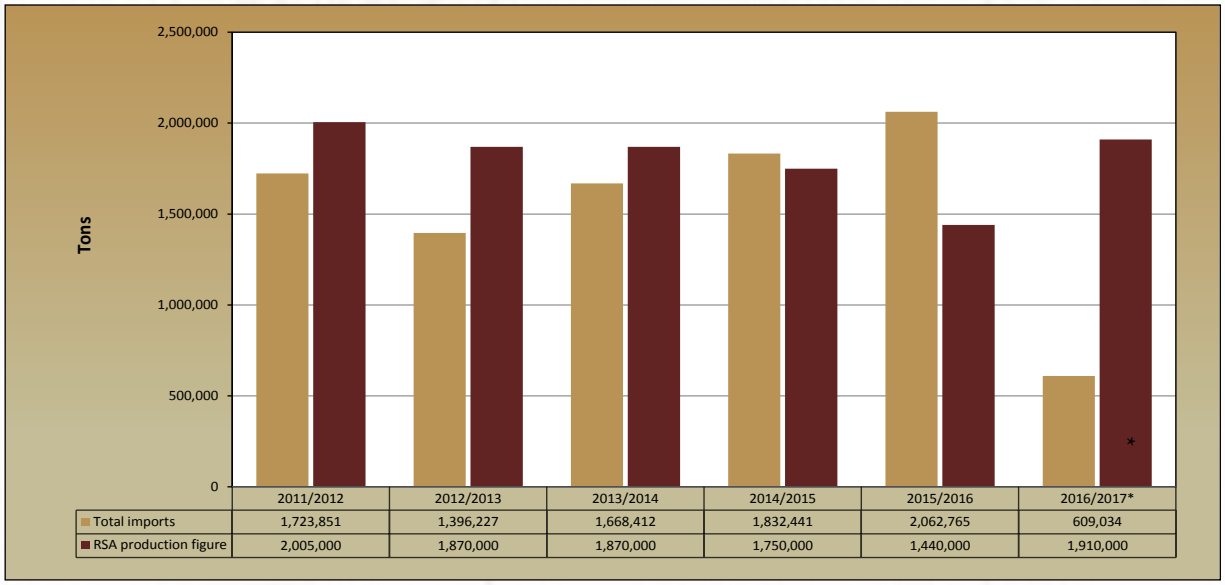
South Africa is a net importer of wheat and relies on imports to supply local demand. Demand for wheat processing (human, animal, and gristing) was fairly stable over the past three seasons, varying 63 116 tons in total. Eight months into the 2016/2017 season this figure stands at 2 069 034 tons, 65.8% of the previous season's figure.

During the 2015/2016 season 2 062 765 tons of wheat were imported for local use. This figure constitutes an almost 13% increase compared to the 2014/2015 season and can be attributed to the severe drought conditions experienced in South Africa during the 2015/2016 season. As for the past several seasons the Russian Federation remains the main origin for wheat imported for use within the RSA, with 956 705 tons imported during 2015/2016. Please see pages 77 to 98 for the quality of the wheat imported during 2015/2016. During the corresponding period, 54 008 tons of wheat from South Africa were exported to countries such as Zimbabwe, Namibia, Botswana and Lesotho. Wheat exports from South Africa decreased by 80% compared to the previous season.

The amount of wheat imported for local consumption so far during the 2016/2017 marketing season, amounts to 609 034 tons according to SAGIS. This figure includes imports up to 7 July 2017 and represents approximately 38% of the amount of wheat imported at the corresponding date during the previous season.

The wheat marketing season commences on the 1st of October every year.

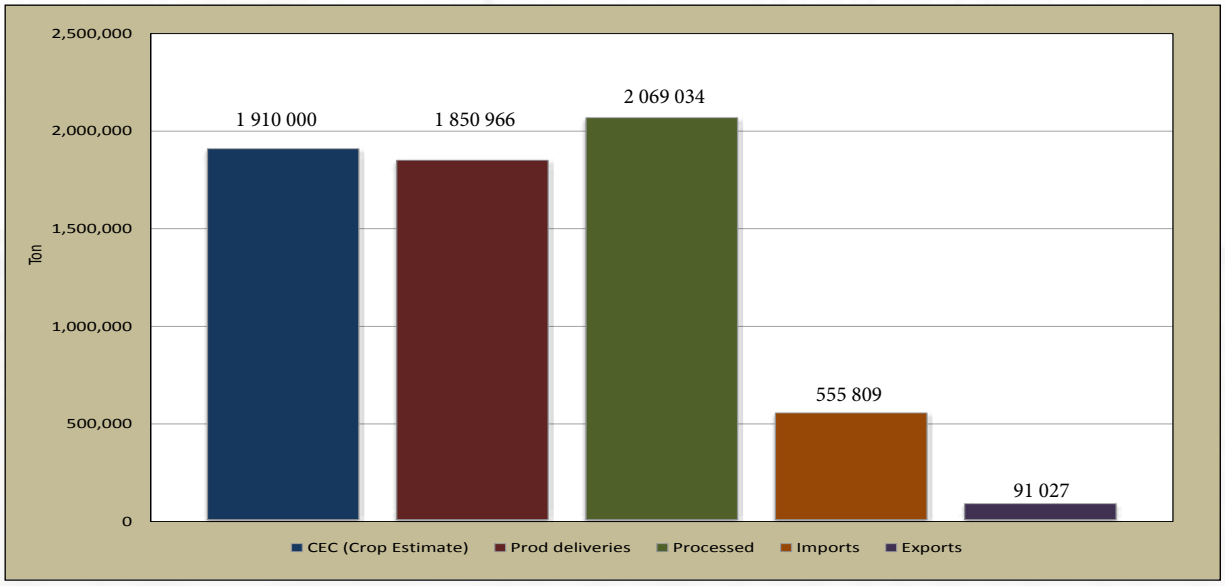
### Graph 5: RSA production figure versus the total import figure over six seasons




| | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017* |
|---|---|---|---|---|---|---|
| Total imports | 1,723,851 | 1,396,227 | 1,668,412 | 1,832,441 | 2,062,765 | 609,034 |
| RSA production figure | 2,005,000 | 1,870,000 | 1,870,000 | 1,750,000 | 1,440,000 | 1,910,000 |

*2016/2017 season figure includes imports up to 7 July 2017.

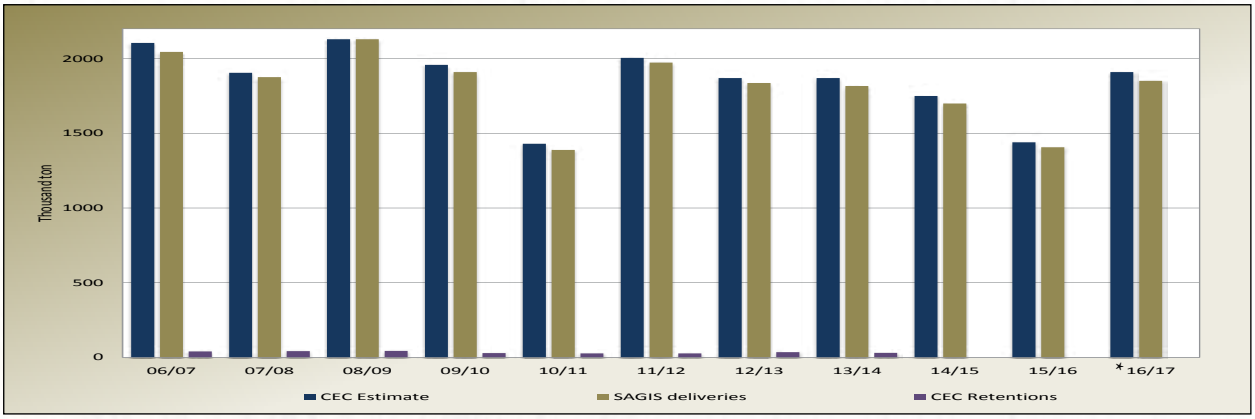
### Graph 6: Wheat supply and demand overview 2016/2017 season (Oct - May)



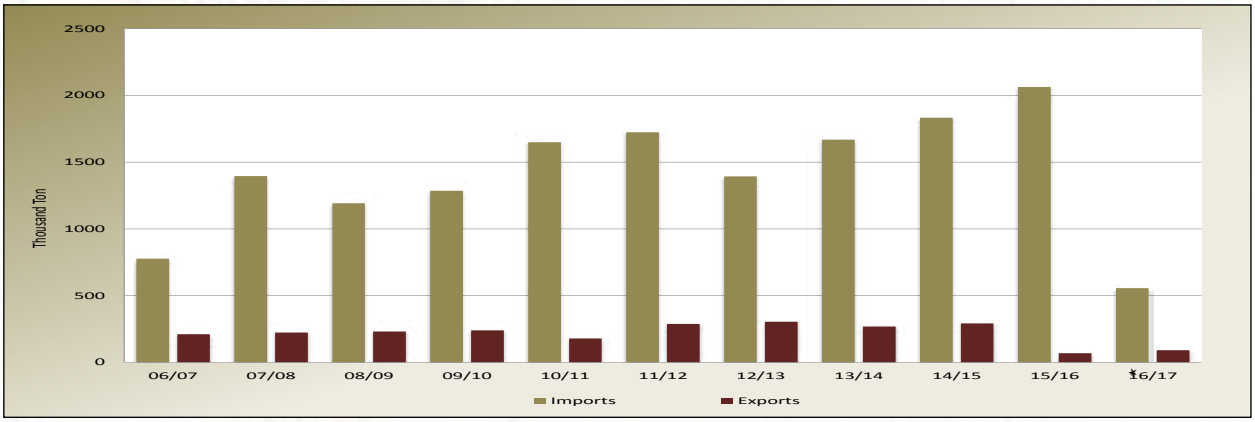

Figures provided by SAGIS, (Publication date: 2017-06-27)

| WHEAT: SUPPLY AND DEMAND TABLE BASED ON SAGIS' INFO | | | | | | | | | | | | Publication date: 2017-06-27 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Season (Oct - Sep) | | | | | | | | | | | | | | | Current Season Oct - May | 10 YEAR AVER-AGE 2006/7-2015/16 |
| | 00/01 | 01/02 | 02/03 | 03/04 | 04/05 | 05/06 | 06/07 | 07/08 | 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16 | 16/17 | |
| | | | | | | | | | | | | | | | | | 8 | |
| CEC | 2 349 000 | 2 493 000 | 2 321 000 | 1 540 000 | 1 680 000 | 1 905 000 | 2 105 000 | 1 905 000 | 2 130 000 | 1 958 000 | 1 430 000 | 2 005 000 | 1 870 000 | 1 870 000 | 1 750 000 | 1 440 000 | 1 910 000 | **1 659 300** |
| CEC (Retention) | | | 33 000 | 40 000 | 38 000 | 50 000 | 40 000 | 42 000 | 43 000 | 29 000 | 27 000 | 26 500 | 35 000 | 30 000 | 0 | 0 | 0 | **24 250** |
| | | | | | | | | | | | | | | | | | | |
| SUPPLY | | | | | | | | | | | | | | | | | | |
| Opening stock (1 Oct) | 507 000 | 551 000 | 580 000 | 897 000 | 598 000 | 574 000 | 582 000 | 376 000 | 509 000 | 694 000 | 579 000 | 478 000 | 651 180 | 489 253 | 488 526 | 596 823 | 827 232 | **495 453** |
| Prod deliveries | 2 353 000 | 2 415 000 | 2 387 000 | 1 512 000 | 1 670 000 | 1 893 000 | 2 045 000 | 1 876 000 | 2 130 000 | 1 910 000 | 1 389 000 | 1 973 000 | 1 837 137 | 1 816 981 | 1 699 546 | 1 406 752 | 1 850 966 | **1 626 644** |
| Imports | 308 000 | 407 000 | 747 000 | 1 042 000 | 1 227 000 | 1 055 000 | 777 000 | 1 396 000 | 1 192 000 | 1 285 000 | 1 649 000 | 1 724 000 | 1 393 215 | 1 668 412 | 1 832 441 | 2 062 765 | 555 809 | **1 331 142** |
| Surplus | 0 | 0 | 0 | 6 000 | 6 000 | 9 000 | 32 000 | 0 | 13 000 | 0 | 23 000 | 14 000 | 0 | 0 | 15 151 | 8 807 | 1 851 | **10 596** |
| Total supply | 3 168 000 | 3 373 000 | 3 714 000 | 3 457 000 | 3 501 000 | 3 531 000 | 3 436 000 | 3 648 000 | 3 844 000 | 3 889 000 | 3 640 000 | 4 189 000 | 3 881 532 | 3 974 646 | 4 035 664 | 4 075 147 | 3 235 858 | **3 463 834** |
| | | | | | | | | | | | | | | | | | | |
| DEMAND | | | | | | | | | | | | | | | | | | |
| Processed | 2 427 000 | 2 541 000 | 2 577 000 | 2 653 000 | 2 736 000 | 2 793 000 | 2 820 000 | 2 845 000 | 2 857 000 | 3 017 000 | 2 945 000 | 3 202 000 | 3 040 086 | 3 175 834 | 3 112 718 | 3 144 414 | 2 069 034 | **2 698 322** |
| -human | 2 424 000 | 2 519 000 | 2 575 000 | 2 652 000 | 2 734 000 | 2 781 000 | 2 818 000 | 2 844 000 | 2 849 000 | 2 991 000 | 2 944 000 | 3 066 000 | 3 008 378 | 3 122 134 | 3 109 022 | 3 142 077 | 2 067 152 | **2 677 148** |
| -animal | 2 000 | 22 000 | 2 000 | 1 000 | 2 000 | 12 000 | 2 000 | 1 000 | 8 000 | 26 000 | 1 000 | 136 000 | 31 694 | 53 695 | 3 696 | 2 337 | 1 882 | **21 173** |
| -gristing | 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 5 | 0 | 0 | 0 | **1** |
| -bio-fuel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Withdrawn by producers | 33 000 | 31 000 | 24 000 | 13 000 | 7 000 | 10 000 | 7 000 | 12 000 | 12 000 | 14 000 | 6 000 | 4 000 | 3 934 | 3 127 | 1 320 | 1 834 | 1 671 | **6 209** |
| Released to end-consumers | 4 000 | 7 000 | 5 000 | 2 000 | 2 000 | 4 000 | 4 000 | 2 000 | 5 000 | 3 000 | 6 000 | 7 000 | 7 322 | 3 095 | 2 802 | 1 907 | 982 | **3 903** |
| Seed for planting purposes | 24 000 | 27 000 | 20 000 | 21 000 | 18 000 | 26 000 | 17 000 | 22 000 | 26 000 | 17 000 | 13 000 | 18 000 | 15 998 | 18 198 | 22 705 | 18 800 | 21 408 | **17 050** |
| Net receipts(-)/disp(+) | 9 000 | 15 000 | 11 000 | 12 000 | 6 000 | 5 000 | 1 000 | 26 000 | 19 000 | 15 000 | 13 000 | 19 000 | 19 990 | 16 172 | 7 468 | 12 435 | 2 415 | **13 289** |
| Deficit | 17 000 | 23 000 | 1 000 | 0 | 0 | 0 | 0 | 9 000 | 0 | 4 000 | 0 | 0 | 713 | 1 243 | 0 | 0 | 0 | **1 371** |
| Exports | 103 000 | 149 000 | 179 000 | 158 000 | 158 000 | 111 000 | 211 000 | 223 000 | 231 000 | 240 000 | 179 000 | 288 000 | 304 236 | 268 451 | 291 828 | 68 525 | 91 027 | **203 659** |
| Total Demand | 2 617 000 | 2 793 000 | 2 817 000 | 2 859 000 | 2 927 000 | 2 949 000 | 3 060 000 | 3 139 000 | 3 150 000 | 3 310 000 | 3 162 000 | 3 538 000 | 3 392 279 | 3 486 120 | 3 438 841 | 3 247 915 | 2 186 537 | **2 943 804** |
| | | | | | | | | | | | | | | | | | | |
| Ending Stock (30 Sep) | 551 000 | 580 000 | 897 000 | 598 000 | 574 000 | 582 000 | 376 000 | 509 000 | 694 000 | 579 000 | 478 000 | 651 000 | 489 253 | 488 526 | 596 823 | 827 232 | 1 049 321 | **520 031** |
| - processed p/month | 202 300 | 211 800 | 214 800 | 221 100 | 228 000 | 232 800 | 235 000 | 237 100 | 238 100 | 251 400 | 245 400 | 266 800 | 253 341 | 264 653 | 259 393 | 262 035 | 258 629 | **224 857** |
| - months' stock | 2.7 | 2.7 | 4.2 | 2.7 | 2.5 | 2.5 | 1.6 | 2.1 | 2.9 | 2.3 | 1.9 | 2.4 | 1.9 | 1.8 | 1.8 | 3.2 | 4.1 | **2** |
| Note: ***Figures for current season up to date | | | | | | | | | | | | | | | | | | |

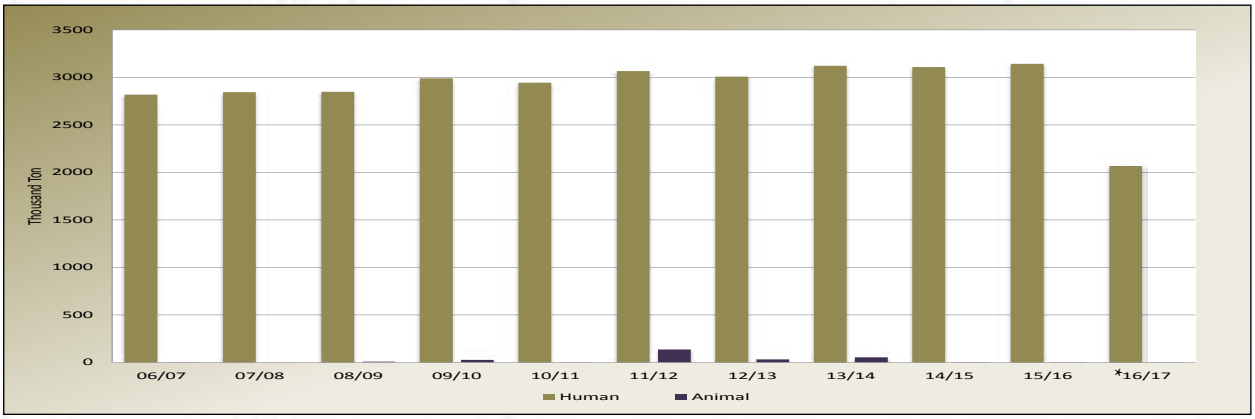
## Graph 7: Wheat: CEC Estimate, Retentions and SAGIS deliveries over seasons



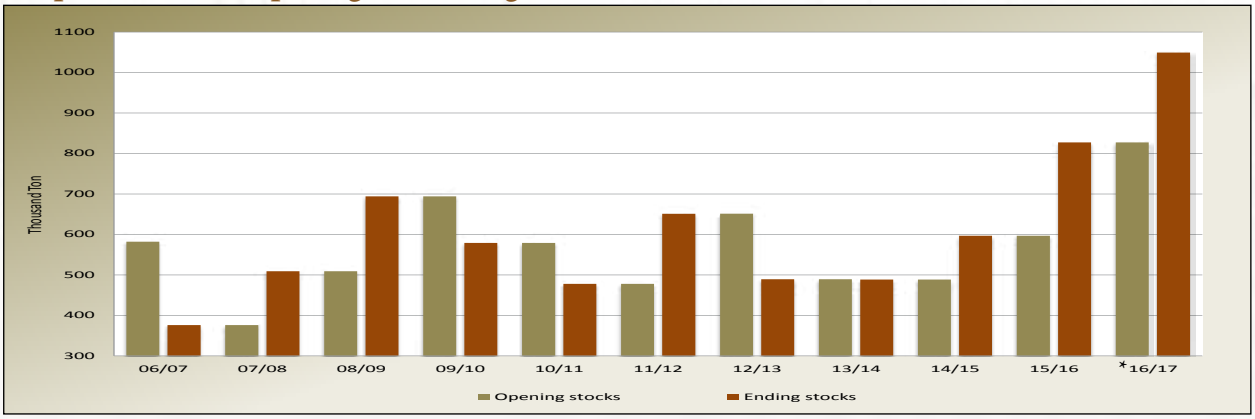

## Graph 8: Wheat: Imports and exports over seasons




## Graph 9: Wheat: RSA consumption over seasons




## Graph 10: Wheat: Opening and ending stocks over seasons




Figures provided by SAGIS, *16/17 figures (Oct - May)

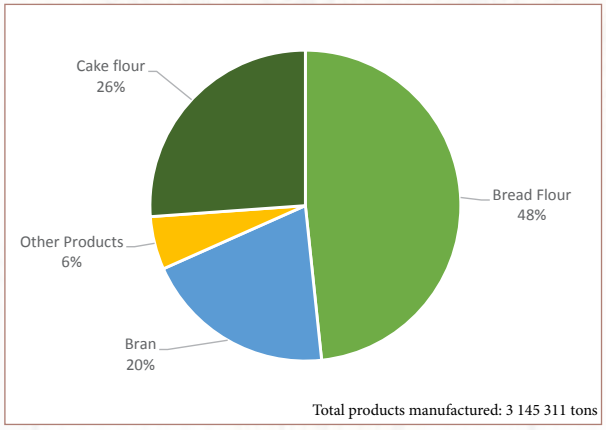
## Wheat Product Information

On 14 November 2014, the Minister of Agriculture, Forestry & Fisheries announced new statutory measures for the manufacturing of maize & wheaten products.

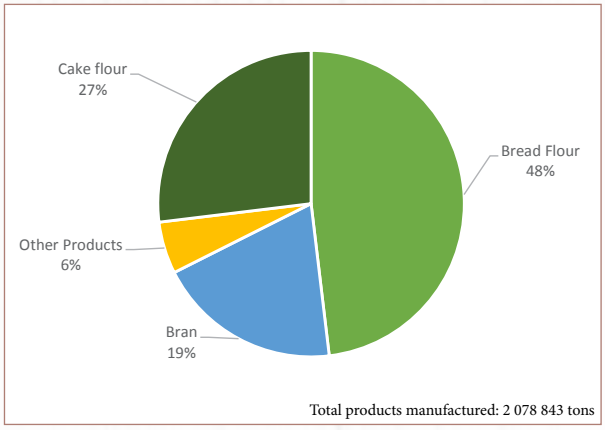
To comply with the abovementioned statutory measures, manufacturers of these products have to register with SAGIS and submit information with regards to the manufacture, import and export of wheat products, as well as the manufacture of pan baked products.

Please see graphs 11 to 16 below as well as the tables on pages 9 and 10 for wheat product and pan baked product progressive figures received by SAGIS.

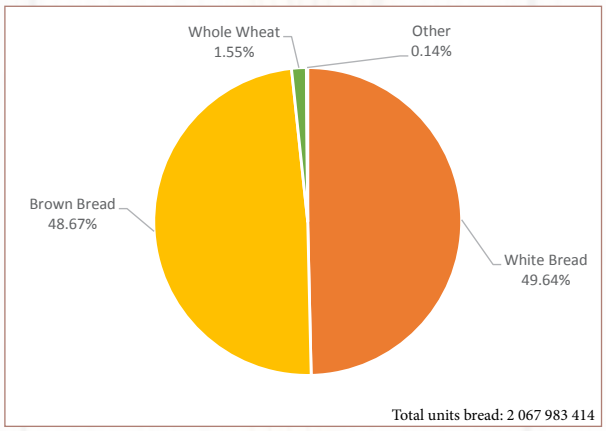
### Graph 11: Wheat products manufactured from Oct 2015 - Sept 2016



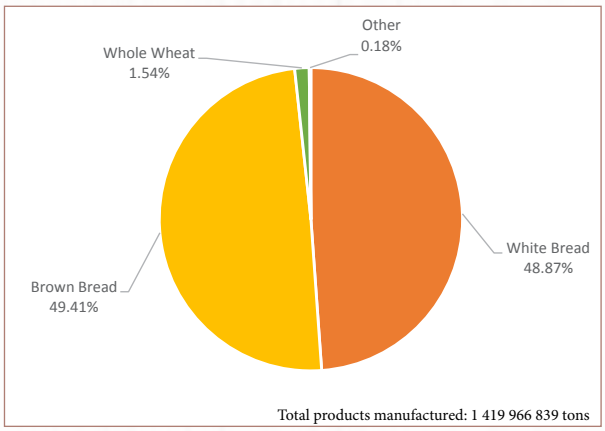

### Graph 12: Wheat products manufactured from Oct 2016 - May 2017



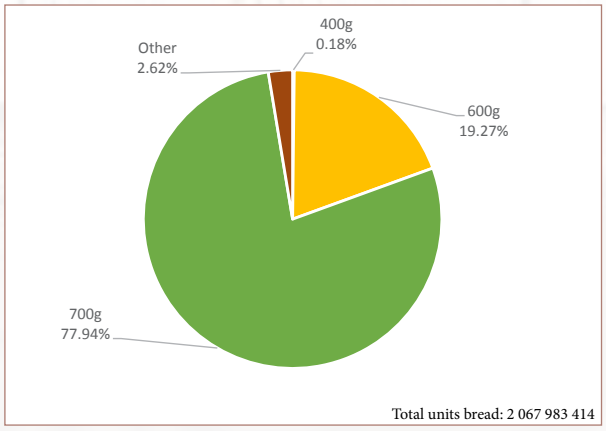

### Graph 13: Pan baked bread per type from Oct 2015 - Sept 2016



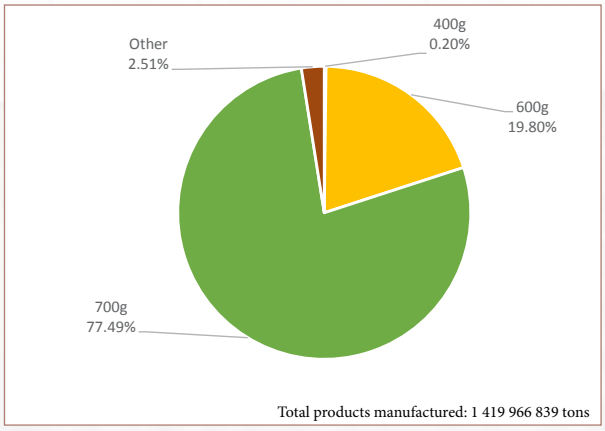

### Graph 14: Pan baked bread per type from Oct 2016 - May 2017




### Graph 15: Pan baked bread per mass Oct 2015 - Sept 2016




### Graph 16: Pan baked bread per mass Oct 2016 - May 2017



| WHEATEN PRODUCTS MANUFACTURED PER MARKETING YEAR | | | |
|---|---|---|---|
| | Marketing year: Jul 2015 - Sep 2015 Manufactured Tons Progressive: 3 Months | Marketing year: Oct 2015 - Sep 2016 Manufactured Tons Progressive: 12 Months | Marketing year: Oct 2016 - May 2017 Manufactured Tons Progressive: 8 Months |
| **Cake Flour** | 225 608 | 821 935 | 559 823 |
| **Self-Raising Flour** | 4 528 | 16 210 | 11 842 |
| **White Bread Flour** | 277 432 | 1 114 696 | 715 713 |
| **Brown Bread Flour** | 100 753 | 402 431 | 282 266 |
| **Other Flour (Industrial)** | 39 571 | 141 380 | 91 220 |
| **Whole Wheat Meal** | 365 | 3 027 | 2 067 |
| **Bran** | 160 103 | 629 298 | 404 837 |
| **Semolina** | 3 898 | 16 334 | 11 075 |
| **Total** | **812 258** | **3 145 311** | **2 078 843** |

| WHEATEN PRODUCTS IMPORTED PER MARKETING YEAR | | | |
|---|---|---|---|
| | Marketing year: Jul 2015 - Sep 2015 Manufactured Tons Progressive: 3 Months | Marketing year: Oct 2015 - Sep 2016 Manufactured Tons Progressive: 12 Months | Marketing year: Oct 2016 - May 2017 Manufactured Tons Progressive: 8 Months |
| **Cake Flour** | 0 | 40 | 0 |
| **Self-Raising Flour** | 0 | 0 | 0 |
| **White Bread Flour** | 88 | 840 | 0 |
| **Brown Bread Flour** | 0 | 40 | 0 |
| **Other Flour (Industrial)** | 0 | 0 | 0 |
| **Whole Wheat Meal** | 0 | 0 | 0 |
| **Bran** | 628 | 450 | 227 |
| **Semolina** | 0 | 0 | 0 |
| **Total** | **716** | **1 370** | **227** |

| WHEATEN PRODUCTS EXPORTED PER MARKETING YEAR | | | |
|---|---|---|---|
| | Marketing year: Jul 2015 - Sep 2015 Manufactured Tons Progressive: 3 Months | Marketing year: Oct 2015 - Sep 2016 Manufactured Tons Progressive: 12 Months | Marketing year: Oct 2016 - May 2017 Manufactured Tons Progressive: 8 Months |
| **Cake Flour** | 1 428 | 2 125 | 1 125 |
| **Self-Raising Flour** | 0 | 0 | 15 |
| **White Bread Flour** | 1 446 | 7 274 | 1 220 |
| **Brown Bread Flour** | 749 | 1 853 | 2 374 |
| **Other Flour (Industrial)** | 12 | 1 976 | 59 |
| **Whole Wheat Meal** | 0 | 0 | 4 |
| **Bran** | 627 | 393 | 0 |
| **Semolina** | 0 | 0 | 0 |
| **Total** | **4 262** | **13 621** | **4 797** |

| PAN BAKED PRODUCTS PER MANUFACTURED PER YEAR | | | |
|---|---|---|---|
| | **Marketing year: Jul 2015 - Sep 2015 Manufactured Tons Progressive: 3 Months** | **Marketing year: Oct 2015 - Sep 2016 Manufactured Tons Progressive: 12 Months** | **Marketing year: Oct 2016 - May 2017 Manufactured Tons Progressive: 8 Months** |
| **WHITE BREAD** | | | |
| 400g (Units) | 554 380 | 2 536 957 | 1 918 143 |
| 600g (Units) | 46 892 681 | 184 045 416 | 123 724 344 |
| 700g (Units) | 208 469 716 | 830 681 443 | 562 636 127 |
| Other (Units) | 1 993 735 | 9 293 238 | 5 631 017 |
| **White Bread (Total Units)** | **257 910 512** | **1 026 557 054** | **693 909 631** |
| | | | |
| **BROWN BREAD** | | | |
| 400g (Units) | 338 362 | 1 064 964 | 805 768 |
| 600g (Units) | 49 698 578 | 213 511 631 | 156 759 222 |
| 700g (Units) | 192 240 180 | 771 863 722 | 531 866 501 |
| Other (Units) | 4 872 150 | 20 136 390 | 12 222 880 |
| **Brown Bread (Total Units)** | **247 149 270** | **1 006 576 707** | **701 654 371** |
| | | | |
| **WHOLE WHEAT** | | | |
| 400g (Units) | 3 670 | 27 137 | 11 295 |
| 600g (Units) | 128 166 | 507 374 | 396 989 |
| 700g (Units) | 2 338 392 | 8 707 512 | 5 553 011 |
| Other (Units) | 5 922 344 | 22 726 394 | 15 904 915 |
| **Whole Wheat (Total Units)** | **8 392 572** | **31 968 417** | **21 866 210** |
| | | | |
| **OTHER** | | | |
| 400g (Units) | 17 782 | 61 892 | 38 463 |
| 600g (Units) | 57 388 | 385 483 | 311 624 |
| 700g (Units) | 105 718 | 487 173 | 329 075 |
| Other (Units) | 105 988 | 1 946 688 | 1 857 465 |
| **Other (Total Units)** | **286 876** | **2 881 236** | **2 536 627** |
| | | | |
| **Total** | **513 739 230** | **2 067 983 414** | **1 419 966 839** |

## Assuring the quality of South African wheat

South Africa has three major wheat-breeding programs. New or introduction cultivars can only be released for planting if it has better agronomical as well as better flour quality characteristics than the cultivars planted commercially in a specific area.

The classification of wheat cultivars is an attempt to provide the wheat industry with new cultivars that perform well agronomically and possess suitable milling, rheological and baking characteristics. Analytical procedures and classification norms are compiled in conjunction with wheat breeders, millers and bakers to ensure market-directed and quality-driven wheat production in the interest of wheat producers and processors.

Classification norms use cultivars as biological quality standards as a frame of reference against which new breeding lines are evaluated. Only cultivars that are successfully grown commercially and possess acceptable agronomical and quality characteristics may be considered as biological quality standards.

As the breeding and development of new wheat varieties with the suitable quality characteristics is an expensive, long-term project, classification norms and quality standards are provided to breeders in an attempt to provide them with guidelines that should stand the test of time. Changing the classification norms and establishing new quality standards are for this reason thoroughly investigated and carefully considered to ensure that the long-term goals of breeding programs are achieved.

The effect of the climate, rainfall, environmental interaction, cultivation practices and other factors that influence wheat quality, makes the use of fixed criteria or norms for classification purposes impractical. For this reason, cultivars are used as biological quality standards, and acceptable deviations from the standard are established as classification norms. Producers continuously strive to improve the wheat yield and quality by selecting the best cultivars for commercial production in a specific area. Grading standards are also set high to ensure adequate quality control.

Various meetings to revive the South African wheat industry has been held since November 2014 and the answer seems to be amongst others a more effective cultivar development and seed breeding system. The availability of new and improved wheat varieties is important as a constant demand exists for higher yields, better quality, better processing properties and increased disease resistance.

Until now, quality was the main focus of breeding programs. Yield was not included as a norm in the cultivar release criteria. Amendments to the release criteria already proposed are: Only two (instead of three) years of data required for final classification of irrigation wheat; yield to be incorporated as criteria norm; relaxed quality criteria with regards to certain quality parameters for high yielding lines.

Breeder lines approved for final classification by the Research Technical Committee for Wheat of the Winter Cereal Trust are registered as a cultivar in accordance with the Plant Breeders' Act, 1976 (Act 15 of 1976) by the applicable breeder company (plant breeder's rights are a form of Intellectual Property rights). Up until the 2016/2017 season, the cultivar in addition, had to be classified in terms of the Regulations relating to the Grading, Packing and marking of Bread Wheat intended for Sale in the Republic of South Africa under the Agricultural Product Standards (APS) Act, 1990 (Act No. 119 of 1990). The cultivar was then listed on the Cultivar list as determined by the Executive Officer: Agricultural Product Standards. All cultivars listed are subject to compulsory certification by SANSOR (South African National Seed Organization) on behalf of the Minister of Agriculture, to ensure cultivar purity and good seed quality. Cultivars cannot be listed on the Cultivar list if Breeders' Rights have not been obtained.

Industry was however informed by the Registrar of the APS Act that the Cultivar list would no longer form part of the Agricultural Product Standards Act. It was suggested by Industry that the Cultivar list be moved to the Plant Improvement Act, which unfortunately did not happen. A satisfactory solution for all stakeholders to this matter is yet to be identified.

Since wheat is a self-pollinating crop, meaning that grain produced has the same genetic composition as the parent, seed can be harvested and replanted, which results in less seed being sold. In South Africa, approximately 70% of wheat is planted with farm saved seed. The investment in the development of new cultivars is as a result only covered by a small portion of the market. A lack of return on investment therefore prevent new seed companies and new cultivars from entering the market. This situation is however not unique to South Africa. In order to address this issue, various End Point Royalty systems were investigated and the outcome was a proposal to establish a statutory levy for breeding and technology, in addition to the industry statutory levy that has been implemented for many years.

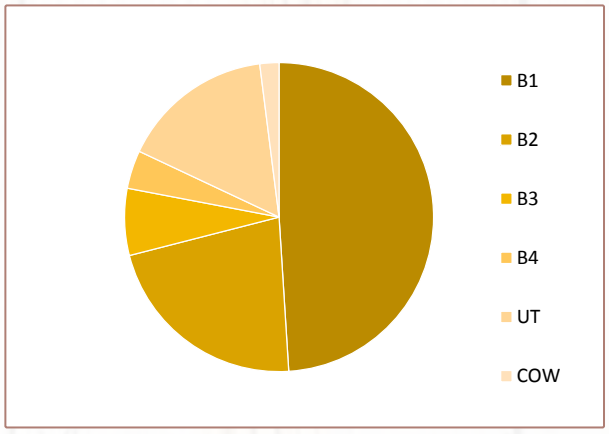
After meetings and consultations with stakeholders and various experts, the South African Cultivar & Technology Agency NPC (SACTA) was established in June 2016. SACTA has been recommended by role-players in the different industries as the body to administer the breeding and technology levy and will make payments to the seed companies from funds collected by means of the levies. The payments will be according to actual performance, calculated each year based on the market share achieved. It is envisaged that this system will eventually be implemented for all self-pollinating crops.

## Wheat grades

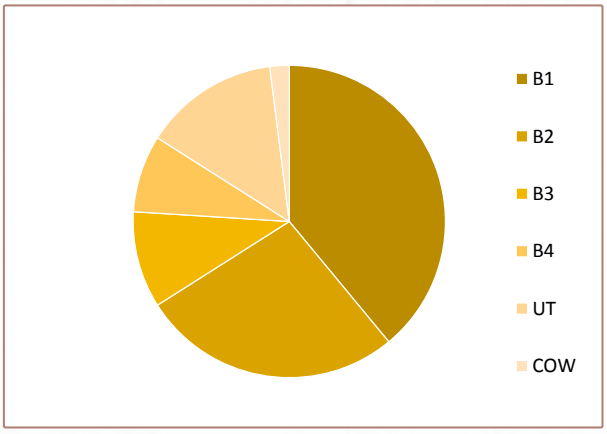
The 337 representative crop samples were graded as follows: 39% was graded B1, 27% was graded B2, 10% was graded B3, 8% was graded B4, 14% UT (Utility Grade) and 2% COW (Class Other Wheat). The majority of the samples (77%) downgraded to Utility Grade was as a result of the percentage of either screenings or other grain and unthreshed ears in combination with the combined deviations exceeding the maximum allowable level for grades B1 to B4. Most of these downgraded samples originated from the Western Cape.

Grade B1 wheat in the Free State province amounted to 71% (52% in the previous season). In the Irrigation areas 52% (60% in the previous season) of the wheat was graded as B1 and in the Western Cape Province 22% was graded as B1 (37% in the previous season).

**Graph 17: Percentage of samples per class and grade in the 2015/2016 season**




**Graph 18: Percentage of samples per class and grade in the 2016/2017 season**



## Table 2: Bread Wheat Grading Table

| Grade | Minimum | | | *Maximum percentage permissible deviation (m/m)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | F | G | H | I | J |
| | Hectolitre mass, kg/hl | Falling number, seconds | Protein content, % | Heavily frost damaged kernels | Field fungi | Storage fungi | Screenings | Other grain and unthreshed ears | Gravel, stones and turf | Foreign matter plus F | Heat damaged kernels | Damaged kernels plus H | Combined deviations (D+E+G+I) |
| Grade 1 | 77 | 220 | 12 | 5 | 2 | 0.5 | 3 | 1 | 0.5 | 1 | 0.5 | 2 | 5 |
| Grade 2 | 76 | 220 | 11 | 5 | 2 | 0.5 | 3 | 1 | 0.5 | 1 | 0.5 | 2 | 5 |
| Grade 3 | 74 | 220 | 10 | 5 | 2 | 0.5 | 3 | 1 | 0.5 | 1 | 0.5 | 2 | 5 |
| Grade 4 | 72 | 200 | 9 | 5 | 2 | 0.5 | 4 | 1 | 0.5 | 1 | 0.5 | 2 | 5 |
| Utility grade | 70 | 150 | 8 | 10 | 2 | 0.5 | 10 | 4 | 0.5 | 3 | 0.5 | 5 | 10 |
| Other Wheat | <70 | <150 | <8 | >10 | >2 | >0.5 | >10 | >4 | >0.5 | >3 | >0.5 | >5 | >10 |
| Minimum size of working samples | 1 kg | 300 g clean | Apparatus instructions | 25 g sifted | 25 g sifted | 100 g sifted | 500 g unsifted | 50 g sifted | 100 g sifted | 100 g sifted | 100 g sifted | 25 g sifted | - |

*Government Notice No. R. 64 of 29 January 2016.*

## WHEAT SEED SOLD BY COMMERCIAL GRAIN STORAGE COMPANIES TO WHEAT PRODUCERS FOR THE 2016 PLANTING SEASON

| Cultivar | % | Cultivar | % |
|---|---|---|---|
| SST 056 | 21.44 | SST 877 | 0.40 |
| SST 087 | 17.00 | PAN 3471 | 0.38 |
| SST 0127 | 14.78 | PAN 3379 | 0.35 |
| SST 015 | 9.39 | SST 317 | 0.32 |
| SST 884 | 6.31 | PAN 3400 | 0.28 |
| SST 88 | 5.02 | Ratel | 0.199 |
| SST 027 | 2.80 | PAN 3195 | 0.197 |
| SST 0117 | 2.59 | Koonap | 0.164 |
| SST 347 | 2.55 | Senqu | 0.162 |
| SST 806 | 2.25 | SST 866 | 0.144 |
| SST 835 | 2.00 | PAN 3497 | 0.115 |
| SST 356 | 1.81 | SST 822 | 0.097 |
| SST 895 | 1.52 | SST 876 | 0.084 |
| SST 843 | 1.37 | SST 0147 | 0.083 |
| PAN 3161 | 1.29 | PAN 3118 | 0.075 |
| SST 387 | 1.03 | Kwartel | 0.068 |
| SST 875 | 1.03 | Duzi | 0.066 |
| Matlabas | 0.81 | SST 867 | 0.041 |
| SST 374 | 0.65 | Krokodil | 0.023 |
| Elands | 0.64 | CRN 826 | 0.005 |
| SST 316 | 0.46 | | 100 |

*Note: These figures are not absolute, but the best and only figures available.*

## Most popular cultivars according to cultivar identification

Farmers in the Western Cape preferred SST 015 (28.8%), SST 88 (24.9%) and SST 087 (23.8%). SST 056 (17.8%) was also a popular cultivar.

In the Vaal and Orange River areas SST 875 (31.5%), SST 884 (28.3%) and PAN 3471 (27.6%) were the most popular cultivars.

The most preferred cultivars in the North West were SST 884 (27.4%) and SST 843 (25.0%), followed by SST 875 (17.3%), SST 835 (9.8%) and Duzi (4.7%).

In regions 21 to 24 of the Free State the preferred cultivars were PAN 3120 (17.3%), PAN 3161 (15.8%), SST 875 (10.0%), PAN 3471 (9.5%) and SST 387 (9.4%). Elands was the most planted cultivar in regions 25 to 28 and represented 18.9%. SST 356 (18.4%), PAN 3161 (13.1%), SST 875 (11.8%) and Matlabas (11.1%) were also popular cultivars.

In Mpumalanga, Gauteng, Limpopo and KwaZulu-Natal, SST 875 (28.9%) was the preferred cultivar, followed by SST 884 (24.0%), Duzi (14.9%), SST 835 (9.5%), SST 843 (7.5%) and SST 876 (6.5%).

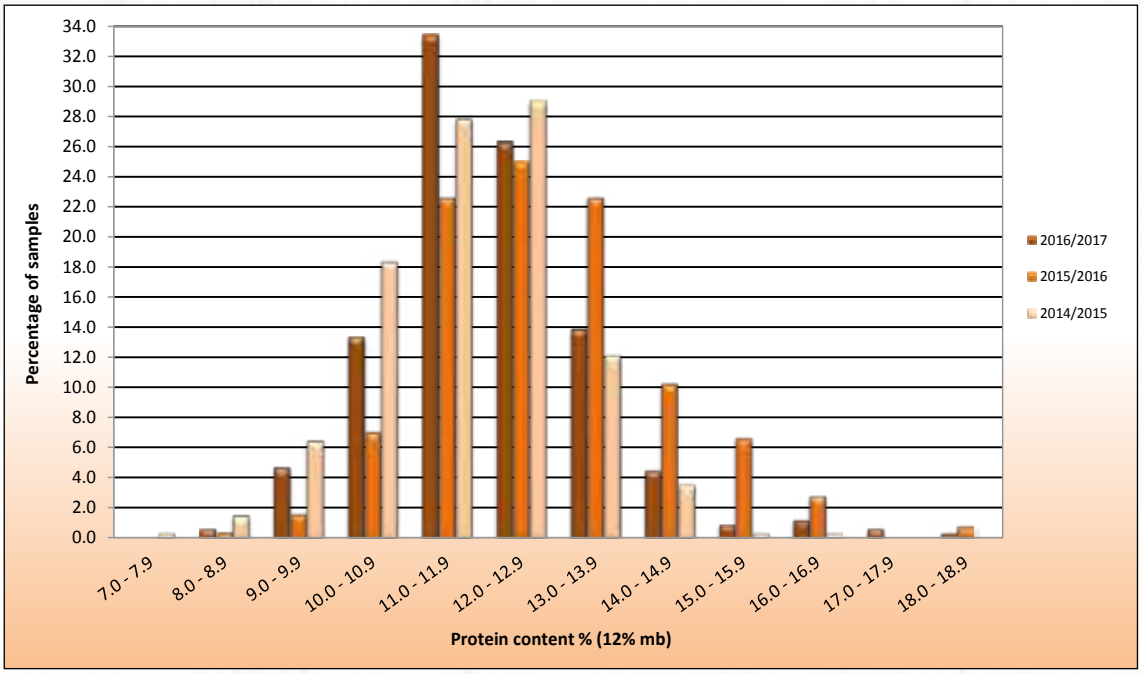
The above-mentioned percentages are weighted averages based on the top five cultivars per region provided on pages 33 to 55. The top five cultivars per region were calculated from the cultivar identification done on each of the 337 crop samples.

## Crop quality of the 2016/2017 season

All national, seasonal and regional averages provided in this report are weighted averages.

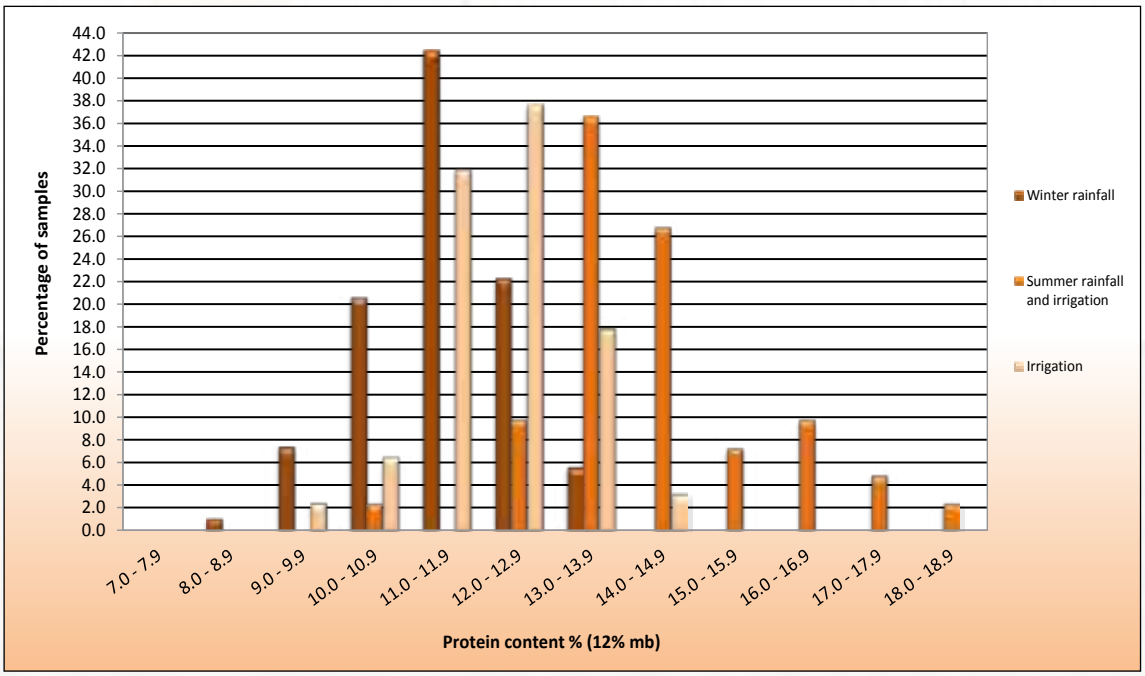
The national whole wheat protein average of 12.0% is the second highest since the 2010/2011 season. Protein content is generally a function of the environment (soil and climatic conditions) where the wheat was grown as well as fertilizer treatment. The percentage of samples with protein contents exceeding 13.0%, decreased significantly from the 43.2% of the previous season (which can be attributed to the extreme drought conditions experienced) to 21.4%, which compares better to the 16.4% and 18.3% respectively of the 2014/2015 and 2013/2014 seasons.

### Graph 19: Protein content distribution over the last three seasons




The Winter rainfall areas reported the second highest whole wheat protein average (after last season) since the 2011/2012 season, namely 11.4%. The Irrigation areas averaged 12.3% and the production regions in the Free State province 14.3% (1.1% higher than last season).

### Graph 20: Protein content distribution between the three production areas



Flour protein content is on average 0.5 to 1.2% lower than that of whole wheat and averaged 11.2% this season. The protein loss can be attributed to the removal of the bran and aleuron layer as well as the germ during milling. The protein content is reported on a 12% moisture basis.

The average hectoliter mass increased by 0.4 kg/hl to 81.5 kg/hl compared to the previous season and was 0.9 kg/hl higher than the seven year weighted average of 80.6 kg/hl for determinations done by means of the Kern 222 instrument. Of the 13 samples that reported values below the 77 kg/hl minimum level for grade B1 wheat, three originated in the Western Cape (Winter rainfall area), one each in the irrigation areas of the Northern Cape and North West and the remainder (eight) of the samples in the Free State. The regional averages ranged from 79.4 kg/hl in the Free State to 82.6 kg/hl in the Irrigation areas.

The 1000 kernel mass, reported on a 13% moisture basis increased from 36.8 g last season to 38.6 g this season and compared well with the 38.8 g of the 2014/2015 season. Averages over production areas varied from 35.4 g in the Free State to 39.6 g in the Winter rainfall area. The weighted average percentage screenings (1.8 mm sieve) of 1.86% was higher than the 1.71% of the previous season and the highest since the 2003/2004 season. The Winter rainfall areas reported the highest average percentage, namely 2.16% and the Free State area the lowest of 1.26%. Eleven of the 337 samples exceeded the 4% maximum permissible screenings level for grade B4.

The weighted average falling number was 356 seconds, lower than last season's 393 seconds and also lower than the ten year weighted average value of 368 seconds. Four of the samples analysed for this survey reported falling number values below 250 seconds and of these two were below 220 seconds. All of these samples originated in the Free State area. The highest average falling number value of 371 seconds, was reported for the Irrigation areas. All falling number values reported, are corrected for the altitude at which the test is performed. During the previous two seasons none and four samples respectively reported falling numbers below 250 seconds.

The weighted mixogram peak time on flour milled on the Quadromat Junior mill averaged 2.7 minutes, equal to last season and shorter than the previous eight seasons and as a result also the ten year average of 2.9 minutes. The weighted mixogram peak time of the flour from the Bühler mill was 2.6 minutes, also equal to the previous season. Mixing time, in general, decreases as protein content increases to about 12.0%, thereafter remaining approximately constant with flour protein increases.

Extraction rate is an indication of the flour yield that can be obtained from a given amount of wheat. The extraction rate achievable on industrial scale mills is a number of percentage points higher than on laboratory scale mills due to an increase in roller surface area. Industrial type mills are also set to obtain optimum extraction rates within certain quality parameters, whereas the milling procedure and laboratory scale mill at SAGL is not set to optimize extraction but rather indicate differences in milling quality. Composite samples per class and grade per production region are cleaned, tempered/conditioned and then milled to facilitate flour and dough quality assessment. The weighted average Bühler MLU 202 laboratory mill extraction for the 70 composite samples was 72.5%, lower than the 73.4% of the previous two seasons.

The average Kent Jones colour this season was -3.8 KJ units, lower than the -3.5 KJ units of the previous season. As from the 2012/2013 survey, a dry colour determination by means of a Konica Minolta CM-5 spectrophotometer is also included. Please see the comparison of the CIE L*a*b* values obtained below. The average and range (in brackets) are provided to assist with interpretation of these parameters:
2016/2017 season: L* 93.71 (92.17 – 94.30), a* 0.46 (0.34 – 0.63) and b* 10.12 (9.03 – 11.65)
2015/2016 season: L* 93.78 (92.99 – 94.40), a* 0.47 (0.06 – 0.59) and b* 9.75 (8.51 – 11.39)
2014/2015 season: L* 93.77 (92.98 – 94.30), a* 0.44 (0.22 – 0.59) and b* 9.72 (8.21 – 11.11)
2013/2014 season: L* 93.99 (93.11 – 94.59), a* 0.40 (0.29 – 0.57) and b* 9.50 (8.49 – 10.63)
2012/2013 season: L* 93.85 (93.14 – 94.39), a* 0.41 (0.26 – 0.54) and b* 9.92 (8.65 – 11.35).
L* represents lightness (100 being white and 0 being black), a* represents green to red variation and b* represents variation from blue to yellow.

The average ash content was determined to be 0.59 % on a dry basis (moisture free basis), compared to the 0.65% of the previous season. According to the Wheat product regulations (Government Notice No. R. 405 of 5 May 2017), cake flour's ash content should not exceed 0.65% and that of white bread flour should be between 0.60 to 1.00%.

The Rapid Visco Analyser (RVA) average peak viscosity of the samples analysed was 2257 cP (centipoise), the minimum viscosity 1742 cP and the final viscosity 2570 cP. Last season the values were 2318 cP, 1709 cP and 2597 cP respectively. The analysis conditions were kept constant during all of the analyses.

The wet gluten (14% mb) averaged 30.7% and the dry gluten, also on a 14% moisture basis, 10.5%. These values are lower than the 31.9% and 11.0% respectively of the previous season, which is expected since the average protein content is also lower than that of the previous season. The average gluten index value was 94, ranging between 63 and 99. The gluten index provides an indication of the gluten strength (higher being better) and is not influenced by the protein content. A value between 70 and 100 is generally accepted as good quality for pan bread baking purposes. The average gluten index value last season was 95.

The farinograph analysis resulted in an average water absorption of 60.1% (60.8% the previous season) and an average development time of 5.2 minutes (5.8 minutes the previous season). The stability value of 8.3 minutes compared well with the 8.0 minutes reported previously. There was also no significant difference between the mixing tolerance indexes of these two seasons, namely 37 BU and 38 BU respectively.

The average alveogram strength was 37.0 $cm^2$ and the average P/L value 0.57 (38.3 $cm^2$ and 0.75 the previous season). The distensibility of the dough as determined by the Alveograph increased compared to the previous season. A combination of this and also a slightly lower stability value resulted in the observed lower P/L value.

The average extensogram strength was 99 $cm^2$ (105 $cm^2$ previous season). The maximum height in Brabender Units did not increase significantly compared to the previous season (364 BU in 2016/2017 and 373 BU in 2015/2016). The extensibility values were similar, 193 mm now and 198 mm previously.

While doing the comparisons between seasons, it was interesting to notice that the average values of the 2016/2017 and 2014/2015 seasons' farinograph, alveograph and extensograph results were almost identical.

The 100 g loaves baked using the straight-dough optimized bread making method, received an evaluation rated as "Excellent". The basis for this evaluation refers to the relationship between the protein content and the bread volume.

This season, for the first time, amino acid profiles of local wheat were determined as part of this survey. Total Amino acid analyses that included 18 amino acids namely Aspartic acid, Glutamic acid, Serine, Glycine, Histidine, Arginine, Threonine, Alanine, Proline, Tyrosine, Valine, Isoleucine, Leucine, Phenylalanine, Lysine, Tryptophan, Cystine and Methionine were performed on forty samples, randomly selected to represent different regions as well as grades. Please see Table 7 on pages 63 to 64 for the results and page 72 for information on the methods followed.

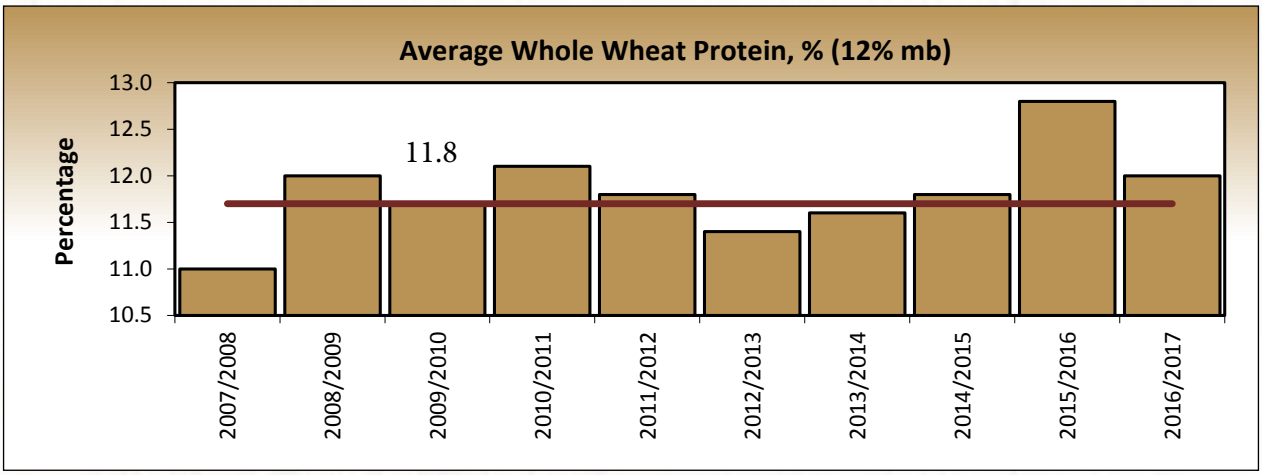
Mycotoxin analysis was performed on forty wheat samples, randomly selected to represent different regions as well as grades. The samples were tested by means of a SANAS ISO/IEC 17025 accredited multi-mycotoxin screening method using UPLC-MS/MS. With this technique simultaneous quantification and confirmation of Aflatoxin $B_1$; $B_2$; $G_1$; $G_2$, Fumonisin $B_1$; $B_2$; $B_3$, Deoxynivalenol, 15-ADON, HT-2 Toxin, T-2 Toxin, Zearalenone and Ochratoxin A is possible in one run.

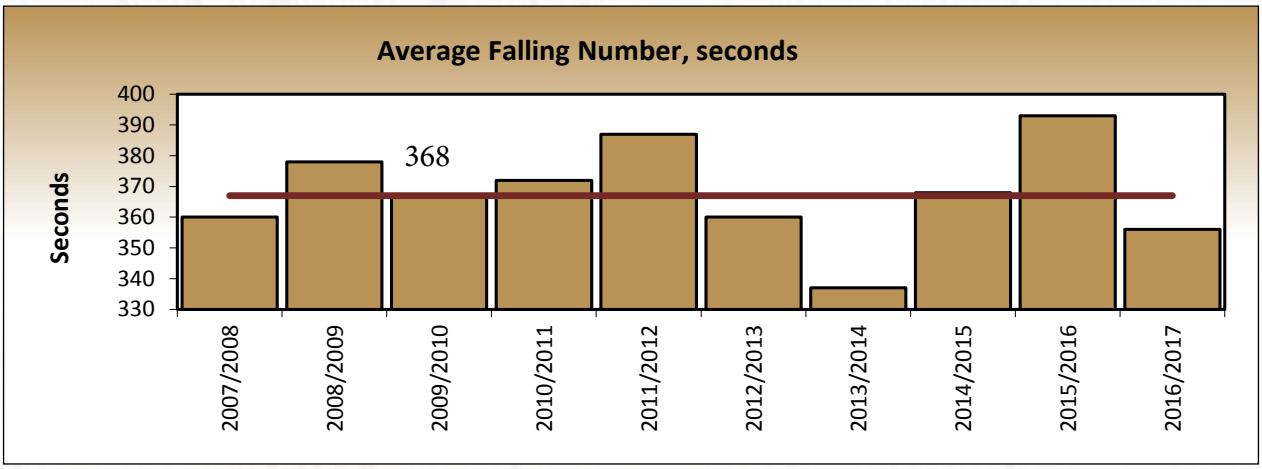
Four samples tested positive for deoxynivalenol (DON) residues. The average value of the four positive results was 289 µg/kg (ppb) and the highest value obtained 501 µg/kg, which is still well below national and international maximum residue levels. Please see the mycotoxin results on pages 59 to 60. Last season, four samples also tested positive for DON residues with an average value of 397 µg/kg (ppb), the highest value obtained was 593 µg/kg.

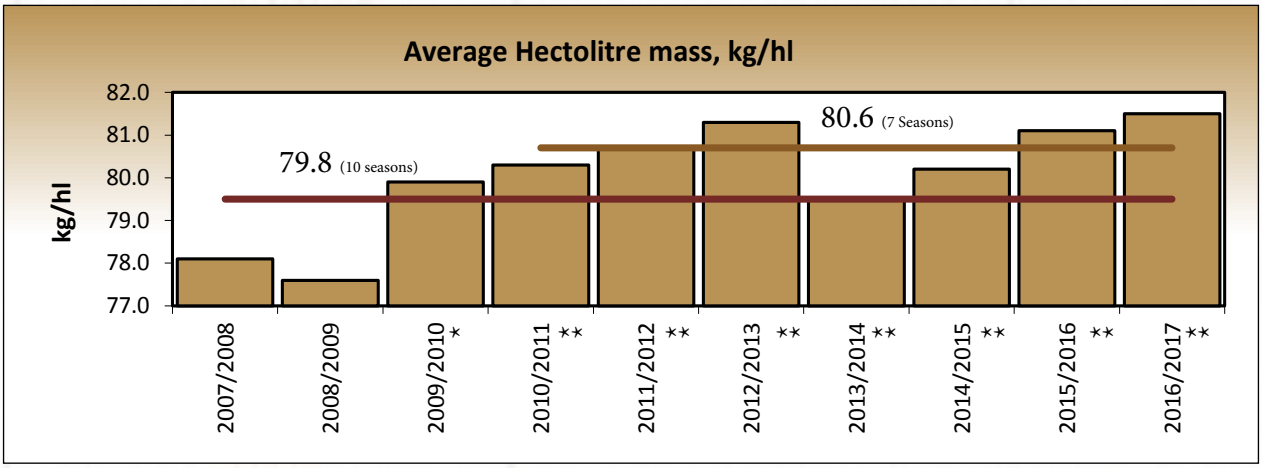
# Table 3: Weighted average results for the last three seasons

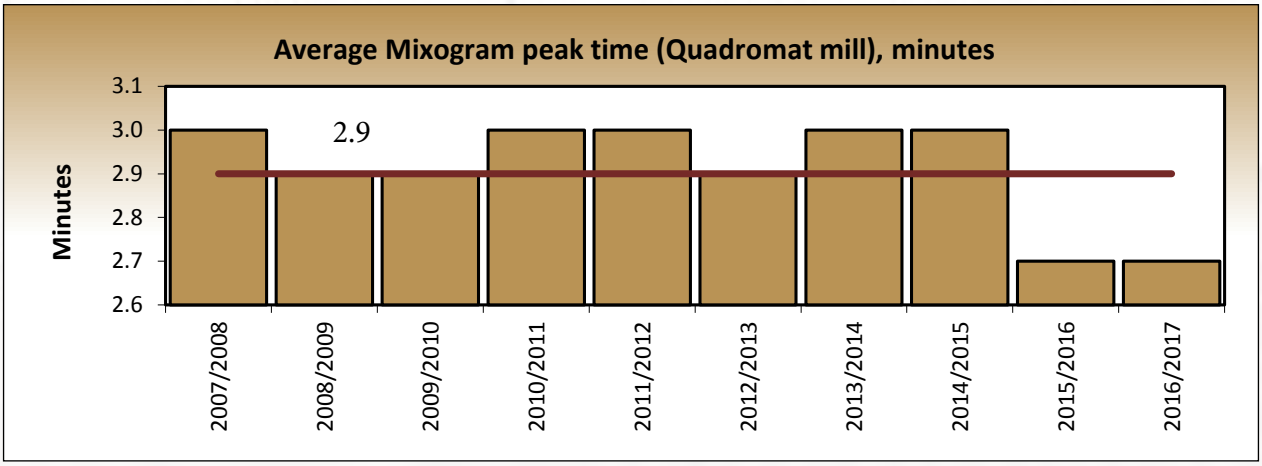
| | 2016/2017 | | | | | 2015/2016 | | | | | 2014/2015 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Protein (12% mb), % | FN, sec | Hlm, kg/hl | Mixo PT, min | *n* | Protein (12% mb), % | FN, sec | Hlm, kg/hl | Mixo PT, min | *n* | Protein (12% mb), % | FN, sec | Hlm, kg/hl | Mixo PT, min | *n* |
| 1 | 11.9 | 377 | 80.5 | 2.8 | *3* | - | - | - | - | - | 11.4 | 310 | 78.5 | 2.9 | *4* |
| 2 | 11.6 | 351 | 79.4 | 2.7 | *20* | 15.0 | 397 | 77.1 | 2.6 | *10* | 11.0 | 401 | 77.0 | 3.2 | *14* |
| 3 | 11.4 | 359 | 81.8 | 2.4 | *77* | 14.4 | 402 | 78.6 | 2.7 | *33* | 11.2 | 380 | 79.9 | 2.6 | *51* |
| 4 | 11.2 | 352 | 82.1 | 2.5 | *30* | 12.4 | 379 | 80.5 | 2.8 | *15* | 10.7 | 388 | 81.3 | 2.6 | *31* |
| 5 | 11.2 | 359 | 80.6 | 2.5 | *20* | 11.1 | 377 | 81.0 | 2.5 | *23* | 11.3 | 381 | 79.0 | 2.8 | *17* |
| 6 | 11.3 | 343 | 80.8 | 2.3 | *24* | 11.3 | 357 | 80.7 | 2.4 | *20* | 11.1 | 360 | 80.2 | 2.4 | *19* |
| 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | 12.0 | 361 | 84.3 | 2.7 | *38* | 12.8 | 378 | 84.0 | 2.3 | *24* | 12.1 | 380 | 80.9 | 2.8 | *23* |
| 11 | 12.6 | 397 | 81.2 | 2.7 | *6* | 12.5 | 408 | 83.2 | 2.5 | *7* | 11.9 | 364 | 82.3 | 2.9 | *12* |
| 12 | 12.8 | 360 | 82.1 | 3.1 | *4* | 13.2 | 409 | 82.0 | 3.0 | *8* | 12.9 | 373 | 81.4 | 3.7 | *4* |
| 13 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14 | 13.0 | 371 | 82.9 | 2.6 | *8* | 12.2 | 428 | 79.4 | 3.0 | *11* | 12.8 | 373 | 83.0 | 3.0 | *4* |
| 15 | - | - | - | - | - | 12.6 | 410 | 83.6 | 2.4 | *4* | - | - | - | - | - |
| 16 | - | - | - | - | - | 11.5 | 540 | 83.8 | 3.0 | *1* | - | - | - | - | - |
| 17 | 11.4 | 373 | 81.4 | 2.5 | *4* | - | - | - | - | - | 11.9 | 387 | 83.1 | 3.4 | *2* |
| 18 | - | - | - | - | - | 13.1 | 430 | 82.5 | 2.4 | *1* | 14.3 | 376 | 79.9 | 4.0 | *2* |
| 19 | 12.3 | 388 | 81.9 | 3.2 | *13* | 11.8 | 402 | 81.1 | 3.0 | *13* | 12.8 | 386 | 82.9 | 3.6 | *2* |
| 20 | 12.2 | 373 | 81.7 | 3.4 | *15* | 12.3 | 425 | 83.8 | 3.3 | *8* | 12.1 | 369 | 80.0 | 3.5 | *15* |
| 21 | - | - | - | - | - | 13.0 | 460 | 78.7 | 3.8 | *1* | 12.3 | 324 | 73.0 | 3.3 | *1* |
| 22 | 15.8 | 349 | 78.7 | 2.7 | *3* | 12.7 | 409 | 83.2 | 2.4 | *2* | 13.4 | 363 | 77.9 | 3.0 | *3* |
| 23 | 15.9 | 309 | 77.1 | 2.8 | *9* | 13.7 | 409 | 78.6 | 3.2 | *8* | 13.3 | 333 | 78.1 | 3.2 | *15* |
| 24 | 13.7 | 347 | 82.0 | 2.7 | *8* | 12.3 | 398 | 81.3 | 2.6 | *11* | 12.4 | 366 | 79.4 | 3.2 | *21* |
| 25 | 14.0 | 293 | 78.9 | 3.3 | *11* | 13.5 | 349 | 81.7 | 2.7 | *9* | 12.0 | 356 | 79.5 | 3.1 | *19* |
| 26 | - | - | - | - | - | 13.8 | 386 | 79.2 | 2.9 | *2* | 11.5 | 364 | 79.5 | 3.3 | *6* |
| 27 | - | - | - | - | - | - | - | - | - | - | 12.8 | 352 | 78.4 | 3.8 | *3* |
| 28 | 13.0 | 327 | 80.1 | 3.4 | *10* | 13.5 | 379 | 81.4 | 2.5 | *11* | 12.3 | 340 | 80.4 | 3.1 | *15* |
| 29 | 12.7 | 291 | 80.8 | 3.1 | *1* | - | - | - | - | - | 12.5 | 350 | 81.3 | 3.3 | *1* |
| 30 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 31 | - | - | - | - | | - | - | - | - | - | - | - | - | - | - |
| 32 | 13.5 | 372 | 81.2 | 3.1 | *3* | 13.4 | 401 | 80.6 | 2.8 | *3* | 12.7 | 282 | 79.7 | 3.3 | *7* |
| 33 | 12.2 | 399 | 81.6 | 3.7 | *13* | 12.5 | 391 | 85.4 | 3.0 | *4* | 11.5 | 408 | 81.5 | 3.1 | *6* |
| 34 | 13.2 | 319 | 81.2 | 3.5 | *3* | 13.2 | 399 | 81.4 | 2.7 | *3* | 11.8 | 338 | 81.5 | 3.6 | *8* |
| 35 | 11.7 | 354 | 82.2 | 3.0 | *11* | 12.1 | 401 | 82.3 | 3.1 | *11* | 11.6 | 374 | 81.4 | 3.5 | *28* |
| 36 | 13.2 | 379 | 81.8 | 3.1 | *3* | 13.6 | 429 | 84.0 | 2.9 | *9* | 12.3 | 354 | 82.2 | 2.8 | *4* |
| Ave. | **12.0** | **356** | **81.5** | **2.7** | ***337*** | **12.8** | **393** | **81.1** | **2.7** | ***252*** | **11.8** | **368** | **80.2** | **3.0** | ***337*** |

## Graph 21: Weighted average quality over 10 seasons




*** Includes addition of 2 kg/hl according to Hectolitre mass Dispensation.**

**** Hectolitre mass determined using Kern 222 instrument.**

## Table 4: Comparison of Flour Quality over the last four seasons

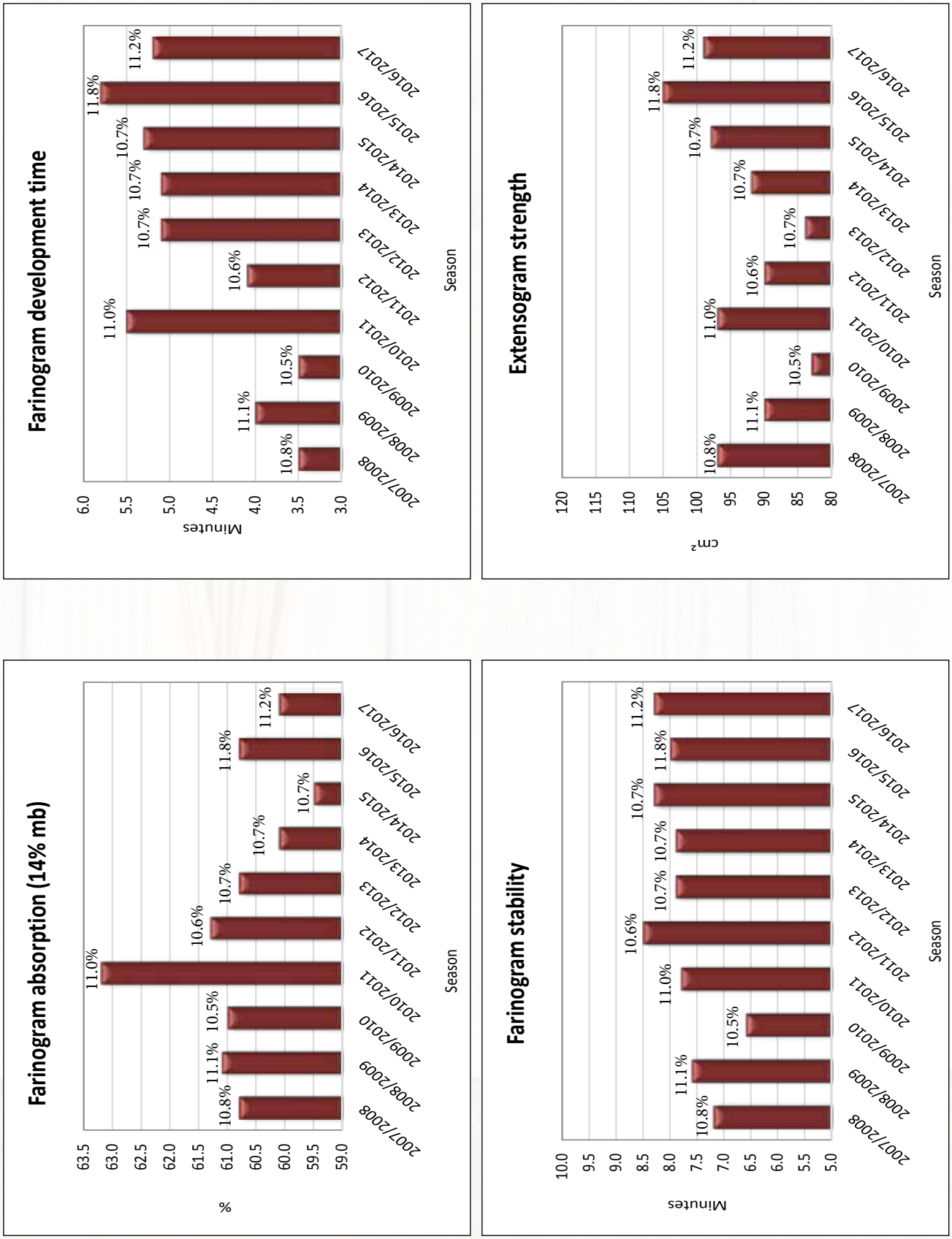
| Flour Quality 2016/2017 season | | | |
|---|---|---|---|
| Flour protein (12% mb) (%) | 11.2 | Farinogram abs. (14% mb) (%) | 60.1 |
| Bread volume 100g ($cm^3$) | 1040 | Farinogram dev. time (min.) | 5.2 |
| Mixogram (Bühler) peak time (min) | 2.6 | Alveogram strength ($cm^2$) | 37.0 |
| Wet gluten (14% mb) (%) | 30.7 | Alveogram P/L | 0.57 |
| Dry gluten (14% mb) (%) | 10.5 | Extensogram strength ($cm^2$) | 99 |

| Flour Quality 2015/2016 season | | | |
|---|---|---|---|
| Flour protein (12% mb) (%) | 11.8 | Farinogram abs. (14% mb) (%) | 60.8 |
| Bread volume 100g ($cm^3$) | 1047 | Farinogram dev. time (min.) | 5.8 |
| Mixogram (Bühler) peak time (min) | 2.6 | Alveogram strength ($cm^2$) | 38.3 |
| Wet gluten (14% mb) (%) | 31.9 | Alveogram P/L | 0.75 |
| Dry gluten (14% mb) (%) | 11.0 | Extensogram strength ($cm^2$) | 105 |

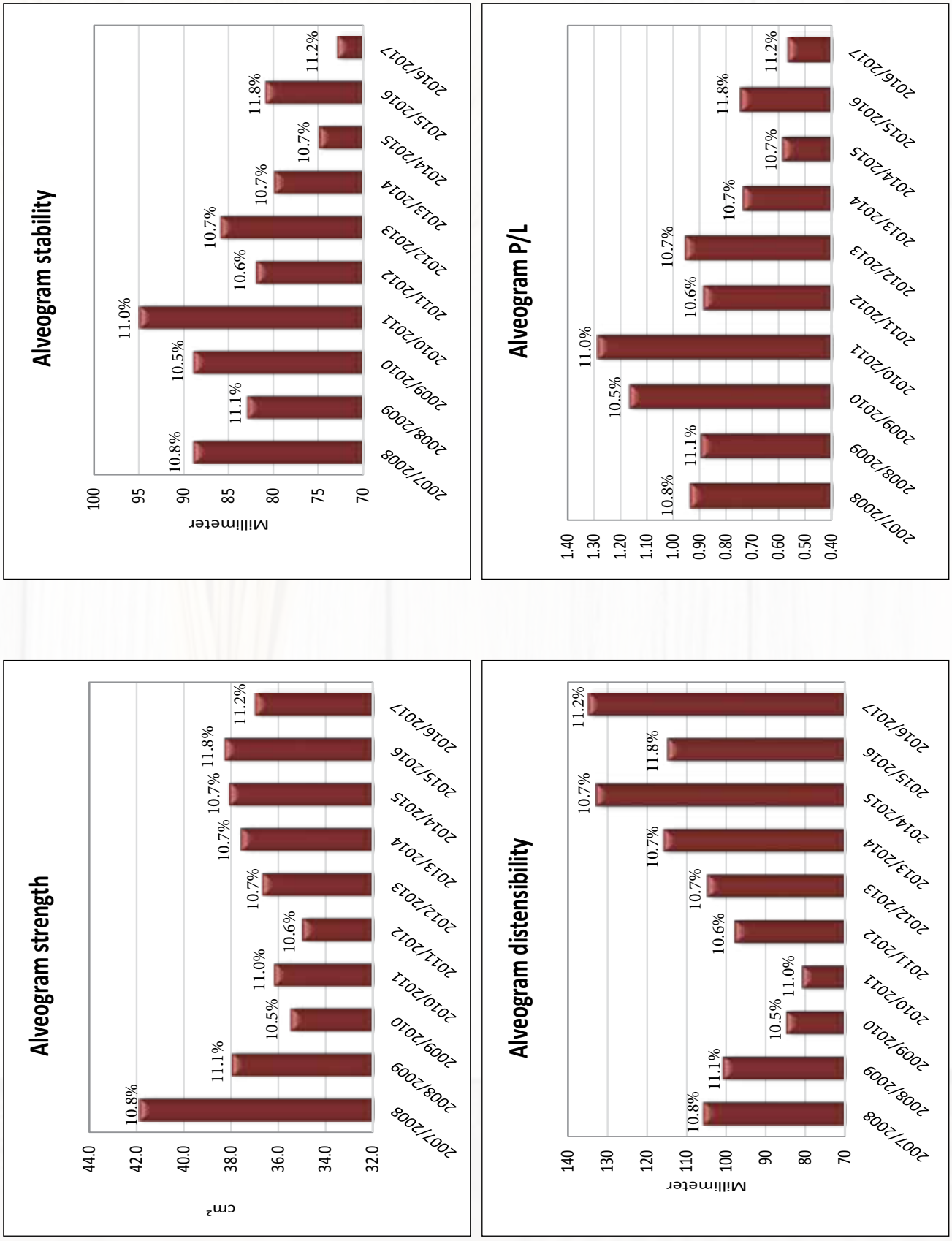
| Flour Quality 2014/2015 season | | | |
|---|---|---|---|
| Flour protein (12% mb) (%) | 10.7 | Farinogram abs. (14% mb) (%) | 59.5 |
| Bread volume 100g ($cm^3$) | 889 | Farinogram dev. time (min.) | 5.3 |
| Mixogram (Bühler) peak time (min) | 2.7 | Alveogram strength ($cm^2$) | 38.1 |
| Wet gluten (14% mb) (%) | 28.9 | Alveogram P/L | 0.59 |
| Dry gluten (14% mb) (%) | 9.8 | Extensogram strength ($cm^2$) | 98 |

| Flour Quality 2013/2014 season | | | |
|---|---|---|---|
| Flour protein (12% mb) (%) | 10.7 | Farinogram abs. (14% mb) (%) | 60.1 |
| Bread volume 100g ($cm^3$) | 868 | Farinogram dev. time (min.) | 5.2 |
| Mixogram (Bühler) peak time (min) | 2.8 | Alveogram strength ($cm^2$) | 37.6 |
| Wet gluten (14% mb) (%) | 29.5 | Alveogram P/L | 0.74 |
| Dry gluten (14% mb) (%) | 10.4 | Extensogram strength ($cm^2$) | 92 |

## Graph 22: Comparison of rheological quality over seasons (Flour protein content (12% mb) is indicated above each bar)



## Graph 22: Comparison of rheological quality over seasons (Flour protein content (12% mb) is indicated above each bar) (continue)



# REGIONAL QUALITY SUMMARY

## WINTER RAINFALL AREA
## (Western Cape)

The Western Cape Province has a Mediterranean climate, characterized by cool, wet winters and hot dry summers. More than 80% of the rainfall is received in winter between April and September, making the Western Cape a predominantly winter rainfall area. The Swartland (on the west coast) and the Rûens (Southern Cape) are the main distinguishable geographic regions.

These two separate wheat farming regions are divided into individual areas according to amongst other their climatic, soil and geographic position. The Swartland region is divided into the following areas: Sandveld, Koringberg, Middle Swartland and High Rainfall Area. The Rûens region is divided into the Western Rûens, Southern Rûens and Eastern Rûens.

The Rûens generally receives higher rainfall than the Swartland, but some areas of the Swartland have better, deeper soils. Wheat is generally planted from the second half of April until the middle of June and harvested during October to December.

The good rains received during January to April in the Swartland did not continue into May, the predominant month when wheat planting commences. Planting conditions were challenging towards the middle of May due to depleted soil moisture, resulting in most of the late plantings done with less or no soil moisture. Rainfall for May was lower than the same time last year. Extremely dry conditions between mid-May and the second week of June led to poor germination and poor stand for crops that managed to germinate. The Pools-Piketberg region endured the worst conditions in the Swartland during this time, evident in the yields realized by the end of the season. The last quarter of the growing season was more favourable for growing conditions, due to frequent rain and cooler temperatures towards the grain filling stage.

Climatic conditions, specifically during planting, were more favourable in the Rûens region than in the Swartland. Good rains during the summer months and months leading up to planting meant that the soil moisture was still sufficient for planting. The Eastern Rûens had less rain than the Southern and Western Rûens towards the end of the planting season. As in the Swartland, conditions improved towards the end of the season, which is reflected in good yields obtained.

The hectolitre mass averaged 81.3 kg/hl compared to the previous season's 79.7 kg/hl. The thousand kernel mass averaged 39.6 gram, 3.0 g higher than the previous season. The average falling number was 355 seconds. The average whole wheat protein content was 11.4% (12% mb), 12.8% in 2015/2016.

The percentage screenings of 2.16% was higher than the previous season's 1.86%, the highest of the three areas and 0.30% higher than the national average for 2016/2017. The mixogram peak time (Quadromat Junior mill) averaged 2.5 minutes, the shortest of the three major production areas. The Bühler extraction averaged 71.8% (average of wheat grades B1 to B4 and UT), equal to 2015/2016. The average wet colour of the flour was -4.0 KJ units and the dry colour L* value (indicating lightness) 94.02. These colour values indicate a white/light flour that is preferred by millers and bakers and compare well previous seasons. The average ash content was 0.58% (db).

The flour protein content averaged 10.2%. The average wet and dry gluten values namely 28.1% and 9.6% (14% mb) were respectively 3.9% and 1.5% lower than the previous season. The gluten index was 94. The average farinogram absorption was 60.2% and the development time 3.8 minutes, the stability averaged 6.3 minutes. The average alveogram strength was 31.4 $cm^2$, 5.3 $cm^2$ lower than last season. The alveogram P/L value was 0.61 compared to the 0.63 of 2015/2016. The average strength on the extensogram was 79 $cm^2$, relatively lower than last season but comparing well with the 80 $cm^2$ of the 2014/2015 season. The mixogram peak time on the Bühler milled flour averaged 2.3 minutes, similar to last season. The 100-gram baking test showed on average an excellent relationship between protein content and bread volume.

## SUMMER RAINFALL AND IRRIGATION AREA
## (Free State)

The summer rainfall area (predominantly the Free State Province) is a major dryland wheat production region of South Africa. Considerable variation in precipitation, soil types and average temperature occurs from east to west. The Free State is therefore commonly divided into four distinct dryland wheat production regions, namely: the South Western Free State, North Western Free State, Central Free State and Eastern Free State.

Rainfall and temperature and in particular the distribution thereof through the growing season, is important for successful wheat production in the summer rainfall areas. Planting dates vary from early to late according to region and commences in May and continues until July. Harvesting takes place from November to January.

In all the regions, good rains occurred in the months prior to planting, resulting in optimum conditions during the first stages of development. "Out of season" rain towards the end of July over the whole production area of the Free State, ensured adequate soil moisture for the coming months. As in the recent past, no spring rain during the months of August, September and the first half of October decreased the yields reported.

The average hectolitre mass was 79.4 kg/hl, 1.4 kg/hl lower than in 2015/2016. The thousand kernel mass (35.4 g) was 0.6 g higher than the previous season, but however still 3.2 g lower than the RSA average. The average percentage screenings was 1.26%. The average whole wheat protein content increased from 13.2% the previous season to 14.3% (12% mb) this season. This protein is the highest of the three production areas. The falling number decreased on average from 387 seconds in 2015/2016 to 319 seconds, the lowest average of the three areas.

The mixogram (Quadromat Junior) peak time of 3.1 minutes was 0.4 minutes longer than the 2.7 minutes of the previous season and compared well with prior seasons. The average Bühler extraction percentage in the Free State was 70.9% (73.6% previous season). The Kent Jones flour colour was -3.1 KJ units (-3.4 KJ units in the previous season) and the L* value 93.09 (previously 93.49). The average ash content was 0.59% and the average flour protein content 13.7%. The wet gluten content (14% mb) was 38.1% and the dry gluten 13.2%, the wet and dry gluten increased by 4.4% and 1.6% respectively. The gluten index averaged 90.

The average farinogram water absorption of 62.7% was higher than the previous season's 62.0% and 2.5 to 3.8% higher than the other two areas. The development time averaged 7.2 and the stability 12.0 minutes, both longer than in 2015/2016. Both the average alveogram strength of 47.7 $cm^2$ and extensogram strength of 115 $cm^2$ increased from the 2015/2016 season. These observations can be expected taking the increased protein content into account. The Bühler milled flour had an average mixograph peak time of 2.7 minutes. The 100-gram baking test showed that the relationship between protein content and bread volume was excellent between the different grades. Based on the average values, the Free State wheat had the strongest rheological (dough) quality.

## IRRIGATION AREAS
## (Northern Cape, North West, Mpumalanga, Gauteng, Limpopo and KwaZulu-Natal)

Generally, the irrigation wheat production areas of South Africa can be divided into four main geographic regions – the Cooler Central irrigation region in the Northern Cape, the Warmer Northern irrigation region in the North West, Limpopo and Gauteng provinces, the Highveld region in Mpumalanga and the Free State, and lastly, the KwaZulu-Natal region.

Planting commences as early as the end of May and continues until the end of July. Harvesting takes place from October to December.

Temperature conditions during this season showed slight deviations to the long-term averages over all the production regions. For the Highveld region, minimum temperatures were above the long-term average during July and August, which could lead to less tillering, affecting the yields realized. Minimum and maximum temperatures were below normal during July in the KwaZulu-Natal region, which could explain the higher yields obtained. The temperatures were very close to the long-term average for the Warmer and Cooler irrigation regions.

The irrigation wheat had the highest weighted average hectolitre mass of 82.6 kg/hl, equal to the previous season. The thousand kernel mass increased by 0.3 g to 38.2 g. The average falling number was 371 seconds (the highest of the three areas). The screenings averaged 1.58%.

The whole wheat protein content was on average 12.3% and the flour's protein content 11.0%, slightly lower than in 2015/2016. The average mixogram (Quadromat Junior) peak time averaged 3.0 minutes. The average Bühler extraction was 73.8%, slightly lower than last season but again the highest of the three production areas.

The dry colour L* value was 93.72 and the Kent Jones wet colour value -3.8 KJ units. The ash content averaged 0.60%. The wet and dry gluten contents were 29.7% and 10.2% respectively and the gluten index 96. The average farinogram water absorption was 58.9% (60.5% during the previous season), the development time 5.6 minutes and the stability 8.4 minutes.

The average alveogram strength was 37.1 $cm^2$ and the average P/L 0.49 (37.5 $cm^2$ and 0.80 respectively the previous season). Lower P/L values are indicative of dough being more extensible (having higher L values) than dough with higher P/L values. The average extensogram strength was 109 $cm^2$. The mixogram peak time averaged 2.8 minutes. The relationship between protein content and 100 g bread volume was also shown to be excellent.

***Production area and climatic condition information were kindly provided by ARC-Small Grain.***

Please see the results provided per individual production region on pages 33 to 56.

# Table 5: Regional quality weighted averages

| | Winter rainfall area (Western Cape) | | | Summer rainfall and Irrigation area (Free State) | | | Irrigation areas | | | RSA average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of samples per area | 174 | | | 41 | | | 122 | | | 337 | | |
| Regions | 1 - 6 | | | 21 - 28 | | | 10 - 11, 12 - 20, 32, 33, 34, 35, 36 | | | All | | |
| **Hectolitre mass dirty, kg/hl** | 81.3 | | | 79.4 | | | 82.6 | | | 81.5 | | |
| **1000 kernel mass (13% mb), g** | 39.6 | | | 35.4 | | | 38.2 | | | 38.6 | | |
| **Falling number, sec** | 355 | | | 319 | | | 371 | | | 356 | | |
| **Screenings (1.8 mm sieve), %** | 2.16 | | | 1.26 | | | 1.58 | | | 1.86 | | |
| **Protein (12% mb), % (ww)** | 11.4 | | | 14.3 | | | 12.3 | | | 12.0 | | |
| **Mixogram peak time, min (Quadromat Junior)** | 2.5 | | | 3.1 | | | 3.0 | | | 2.7 | | |
| ***Composite samples per class and grade*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** |
| | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** |
| ***Composite samples, n = 70*** | ***5*** | ***5*** | ***5*** | ***5*** | ***1*** | ***3*** | ***13*** | ***8*** | ***3*** | ***23*** | ***14*** | ***11*** |
| | ***5*** | ***6*** | - | ***1*** | ***3*** | - | ***4*** | ***2*** | ***1*** | ***10*** | ***11*** | ***1*** |
| **Bühler extraction, %** | 71.7 | 72.0 | 72.4 | 72.1 | 67.2 | 70.3 | 73.5 | 73.9 | 73.9 | 72.8 | 72.7 | 72.2 |
| | 71.8 | 71.1 | - | 69.9 | 71.1 | - | 74.7 | 74.0 | 73.1 | 72.8 | 71.6 | 73.1 |
| **Flour colour, KJ (wet)** | -4.0 | -4.0 | -4.0 | -3.4 | -2.5 | -2.6 | -3.6 | -3.9 | -4.1 | -3.7 | -3.8 | -3.6 |
| | -4.0 | -4.1 | - | -3.2 | -3.1 | - | -4.1 | -4.0 | -3.4 | -4.0 | -3.8 | -3.4 |
| **Colour, Minolta CM5 (dry)** | | | | | | | | | | | | |
| **L*** | 94.00 | 94.01 | 94.04 | 93.35 | 92.28 | 92.92 | 93.64 | 93.66 | 93.86 | 93.65 | 93.68 | 93.68 |
| | 93.95 | 94.11 | - | 93.10 | 93.08 | - | 94.02 | 93.82 | 93.38 | 93.90 | 93.77 | 93.38 |
| **b*** | 10.41 | 10.41 | 10.02 | 10.21 | 10.90 | 10.35 | 9.61 | 9.99 | 10.23 | 9.91 | 10.21 | 10.17 |
| | 10.89 | 10.05 | - | 10.45 | 10.26 | - | 9.98 | 9.74 | 10.15 | 10.48 | 10.05 | 10.15 |
| **Ash (db), %** | 0.58 | 0.57 | 0.58 | 0.58 | 0.64 | 0.57 | 0.59 | 0.61 | 0.60 | 0.58 | 0.60 | 0.58 |
| | 0.58 | 0.59 | - | 0.60 | 0.62 | - | 0.61 | 0.61 | 0.62 | 0.60 | 0.60 | 0.62 |
| **Flour protein (12% mb), %** | 11.5 | 10.5 | 9.7 | 13.1 | 16.9 | 13.5 | 11.9 | 10.7 | 9.7 | 12.1 | 11.1 | 10.7 |
| | 9.5 | 10.0 | - | 12.5 | 14.1 | - | 9.9 | 10.7 | 12.6 | 9.9 | 11.2 | 12.6 |

# Table 5: Regional quality weighted averages (continue)

| | Winter rainfall area (Western Cape) | | | Summer rainfall and Irrigation area (Free State) | | | Irrigation areas | | | RSA average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Regions** | 1 - 6 | | | 21 - 28 | | | 10 - 11, 12 - 20, 32, 33, 34, 35, 36 | | | All | | |
| ***Composite samples per class and grade*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** | ***B1*** | ***B2*** | ***B3*** |
| | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** | ***B4*** | ***UT*** | ***COW*** |
| ***Composite samples, n = 70*** | ***5*** | ***5*** | ***5*** | ***5*** | ***1*** | ***3*** | ***13*** | ***8*** | ***3*** | ***23*** | ***14*** | ***11*** |
| | ***5*** | ***6*** | - | ***1*** | ***3*** | - | ***4*** | ***2*** | ***1*** | ***10*** | ***11*** | ***1*** |
| **Wet gluten (14% mb), %** | 32.2 | 28.8 | 27.0 | 36.3 | 51.1 | 37.1 | 32.1 | 29.3 | 25.9 | 33.0 | 30.7 | 29.5 |
| | 25.5 | 27.3 | - | 33.6 | 39.1 | - | 24.5 | 29.8 | 34.3 | 25.9 | 31.0 | 34.3 |
| **Dry gluten (14% mb), %** | 11.0 | 9.8 | 9.2 | 12.8 | 17.4 | 12.6 | 11.1 | 10.0 | 8.6 | 11.5 | 10.5 | 10.0 |
| | 8.6 | 9.4 | - | 11.7 | 13.4 | - | 8.3 | 10.1 | 12.0 | 8.8 | 10.6 | 12.0 |
| **Gluten Index** | 94 | 93 | 95 | 94 | 63 | 91 | 96 | 96 | 97 | 95 | 93 | 94 |
| | 94 | 94 | - | 96 | 92 | - | 97 | 96 | 96 | 96 | 93 | 96 |
| **Farinogram: Water absorption (14% mb), %** | 61.2 | 60.5 | 60.1 | 62.5 | 67.9 | 63.0 | 60.1 | 58.8 | 57.6 | 60.8 | 60.1 | 60.2 |
| | 59.2 | 59.8 | - | 60.1 | 62.0 | - | 55.6 | 59.2 | 59.7 | 57.8 | 60.3 | 59.7 |
| **Farinogram: Development time, min** | 5.0 | 3.9 | 3.4 | 6.8 | 9.0 | 7.4 | 6.4 | 5.6 | 5.3 | 6.2 | 5.3 | 5.0 |
| | 3.3 | 3.6 | - | 6.8 | 7.1 | - | 3.5 | 4.2 | 6.5 | 3.7 | 4.7 | 6.5 |
| **Farinogram: Stability, min** | 7.3 | 6.0 | 5.0 | 9.9 | 15.9 | 12.7 | 9.4 | 8.2 | 7.5 | 9.0 | 8.0 | 7.8 |
| | 5.6 | 7.2 | - | 15.9 | 12.3 | - | 7.3 | 5.6 | 9.3 | 7.3 | 8.3 | 9.3 |
| **Alveogram: Strength (S), cm²** | 36.3 | 31.0 | 28.8 | 48.5 | 51.5 | 45.3 | 42.4 | 35.3 | 31.7 | 42.4 | 34.9 | 34.1 |
| | 29.4 | 31.7 | - | 45.9 | 48.2 | - | 30.1 | 31.7 | 37.8 | 31.3 | 36.2 | 37.8 |
| **Alveogram: P/L** | 0.52 | 0.54 | 0.69 | 0.56 | 0.71 | 0.85 | 0.45 | 0.58 | 0.48 | 0.49 | 0.57 | 0.68 |
| | 0.64 | 0.66 | - | 0.75 | 0.60 | - | 0.41 | 0.49 | 0.59 | 0.56 | 0.61 | 0.59 |
| **Extensogram: Strength, cm²** | 93 | 81 | 67 | 113 | 90 | 102 | 122 | 100 | 92 | 113 | 93 | 85 |
| | 69 | 80 | - | 137 | 131 | - | 104 | 89 | 126 | 89 | 97 | 126 |
| **Mixogram peak time, min** | 2.2 | 2.2 | 2.2 | 2.6 | 2.0 | 2.8 | 2.8 | 2.8 | 2.9 | 2.6 | 2.5 | 2.6 |
| | 2.4 | 2.4 | - | 3.2 | 2.7 | - | 3.1 | 2.4 | 2.9 | 2.8 | 2.5 | 2.9 |
| **Relationship between protein and bread volume** | EX | EX | EX | EX | EX | VG | EX | EX | EX | EX | EX | EX |
| | EX | EX | - | EX | EX | - | EX | EX | EX | EX | EX | EX |

EX = Excellent VG = Very Good

## RSA Production Regions

The RSA is divided into 9 provinces as illustrated in Figure 1.

### Figure 1: RSA Provinces


Provincial map with gratitude to SiQ.

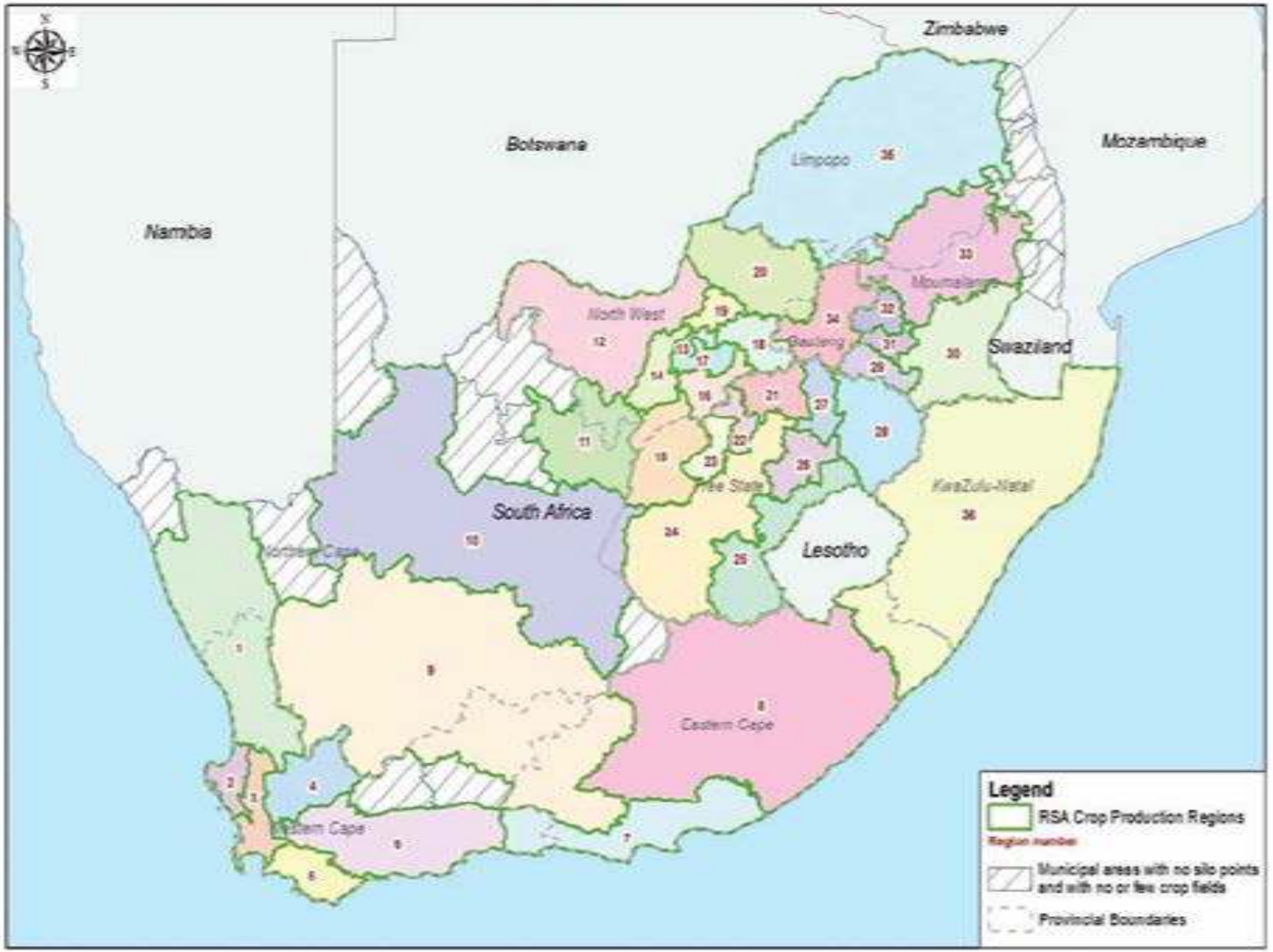
The 9 provinces are divided into 36 grain production regions.

The regions are distributed as follows:
Region 1: Namakwaland
Regions 2 and 3: Swartland
Regions 4 to 6: Rûens
Regions 7 and 8: Eastern Cape
Region 9: Karoo
Region 10: Griqualand West
Region 11: Vaalharts
Regions 12 to 20: North West
Regions 21 to 28: Free State
Regions 29 to 33: Mpumalanga
Region 34: Gauteng
Region 35: Limpopo
Region 36: KwaZulu-Natal

Please see the Crop Production Regions map on the next page.

The production regions from which wheat samples were received for the crop quality survey of the 2016/2017 production season, are named and described on pages 30 to 32. The silo/intake stands as well as the type of storage structure are provided.

**Figure 2: RSA Crop Production Regions**




Regional map with gratitude to Agbiz Grain and SiQ.

# Grain Production Regions

**Silo/Intake stands per region indicating type of storage structure**

## Region 1: Namakwaland Region

| | |
|---|---|
| KaapAgri | Graafwater (Bags/Bins) |

## Region 2: Swartland Western Region

| | | | |
|---|---|---|---|
| KaapAgri | Darling (Bins) | OverbergAgri | Bergrivier (Bins) |
| KaapAgri | Vredenburg (Bins) | OverbergAgri | Koperfontein (Bins) |

## Region 3: Swartland Central Region

| | | | |
|---|---|---|---|
| KaapAgri | Eendekuil *(Bins)* | KaapAgri | Ruststasie *(Bins)* |
| KaapAgri | Klipheuwel *(Bins)* | OverbergAgri | Koringberg *(Bins)* |
| KaapAgri | Malmesbury *(Bins)* | OverbergAgri | Moorreesburg *(Bins)* |
| KaapAgri | Piketberg *(Bins)* | OverbergAgri | Moravia *(Bins)* |
| KaapAgri | Pools *(Bins)* | Afgri | Eensgezind *(Bunkers)* |

## Region 4: Swartland Eastern Region

| | | | |
|---|---|---|---|
| KaapAgri | Ceres *(Bunkers)* | KaapAgri | Porterville *(Bins)* |
| KaapAgri | Ceres *(Bins)* | KaapAgri | Riebeeck-Wes *(Bins)* |
| KaapAgri | Gouda *(Bins)* | OverbergAgri | Leliedam *(Bins)* |
| KaapAgri | Halfmanshof *(Bins)* | | |

## Region 5: Rûens Western Region

| | | | |
|---|---|---|---|
| OverbergAgri | Bredasdorp *(Bags/Bins/Bunkers)* | OverbergAgri | Napier *(Bags/Bins)* |
| OverbergAgri | Caledon *(Bins/Bunkers)* | OverbergAgri | Protem *(Bags/Bins)* |
| OverbergAgri | Klipdale *(Bags/Bins)* | OverbergAgri | Rietpoel *(Bags/Bins/Bunkers)* |
| OverbergAgri | Krige *(Bags/Bins/Bunkers)* | | |

## Region 6: Rûens Eastern Region

| | | | |
|---|---|---|---|
| SSK | Albertinia *(Bins)* | SSK | Krombeks *(Bins)* |
| SSK | Ashton *(Bags/Bins)* | SSK | Protem *(Bags/Bins)* |
| SSK | Heidelberg *(Bins)* | SSK | Riversdal *(Bins)* |
| SSK | Herold *(Bins)* | SSK | Swellendam *(Bags/Bins)* |
| SSK | Karringmelk *(Bags/Bins)* | | |

## Region 10: Griqualand West Region

| | | | |
|---|---|---|---|
| GWK | Douglas *(Bags/Bins)* | GWK | Trans Oranje *(Bags/Bins/Bunkers)* |
| GWK | Luckhoff *(Bins)* | OVK | Havenga Brug *(Bins)* |
| GWK | Marydale *(Bins)* | OVK | Morgenzon *(Bins)* |
| GWK | Modderrivier *(Bags/Bins/Bulk)* | OVK | Oranjerivier *(Bins/Bunkers)* |
| GWK | Prieska *(Bins/Dams)* | OVK | Prieska *(Bins/Bunkers)* |
| GWK | Rietrivier *(Bins)* | OVK | Rietrivier *(Bins)* |

## Region 11: Vaalharts Region

| | | | |
|---|---|---|---|
| GWK | Barkly-Wes *(Bins/Bulk)* | Senwes | Jan Kempdorp *(Bins)* |
| GWK | Jan Kempdorp *(Bags/Bunkers)* | Senwes | Magogong *(Bins)* |
| Senwes | Hartswater *(Bins)* | | |

## Region 12: North West Western Region

| | | | |
|---|---|---|---|
| NWK | Blaauwbank *(Bins)* | NWK | Mareetsane *(Bins)* |
| NWK | Bührmannsdrif *(Bins)* | Suidwes Landbou | Kameel *(Bins)* |
| NWK | Kameel *(Bins)* | Suidwes Landbou | Vryburg *(Bins)* |

# Grain Production Regions

**Silo/Intake stands per region indicating type of storage structure**

## Region 14: North West Southern Region

| | | | |
|---|---|---|---|
| NWK | Barberspan *(Bins)* | NWK | Taaibospan *(Bins)* |
| NWK | Delareyville *(Bins)* | Suidwes Landbou | Amalia *(Bins)* |
| NWK | Excelsior *(Bins)* | Suidwes Landbou | Hallatshope *(Bins)* |
| NWK | Geysdorp *(Bins)* | Suidwes Landbou | Migdol *(Bins)* |
| NWK | Migdol *(Bins)* | Suidwes Landbou | Schweizer-Reneke *(Bins)* |
| NWK | Nooitgedacht *(Bins)* | | |

## Region 17: North West Central Region (Ottosdal)

| | | | |
|---|---|---|---|
| NWK | Boschpoort *(Bags/Bins/Bulk)* | NWK | Vermaas *(Bins)* |
| NWK | Kleinharts *(Bins)* | Senwes | Hartbeesfontein *(Bins)* |
| NWK | Ottosdal *(Bins)* | Senwes | Melliodora *(Bins)* |
| NWK | Rostrataville *(Bins)* | Senwes | Werda *(Bins)* |

## Region 19: North West Central Region (Lichtenburg)

| | | | |
|---|---|---|---|
| Afgri | Lichtenburg *(Bunkers)* | NWK | Lottie Halte *(Bins)* |
| NWK | Grootpan *(Bins)* | NWK | Lusthof *(Bins)* |
| NWK | Halfpad *(Bins)* | NWK | Lichtenburg Silo 3 *(Bins)* |
| NWK | Hibernia *(Bins)* | NWK | Lichtenburg Silo 5 *(Bins)* |

## Region 20: North West Eastern Region

| | | | |
|---|---|---|---|
| Afgri | Battery ((Bins) | NWK | Koster *(Bins)* |
| Afgri | Brits *(Bins)* | NWK | Swartruggens *(Bins)* |
| NWK | Boons *(Bins)* | NWK | Syferbult *(Bins)* |
| NWK | Derby *(Bins)* | | |

## Region 22: Free State North Western Region (Bothaville)

| | | | |
|---|---|---|---|
| Senwes | Allanrigde *(Bins)* | Senwes | Schoonspruit *(Bins)* |
| Senwes | Bothaville *(Bins)* | Senwes | Schuttesdraai *(Bins)* |
| Senwes | Mirage *(Bins)* | Suidwes Landbou | Misgunst (Bunkers) |
| Senwes | Odendaalsrus *(Bins)* | | |

## Region 23: Free state North Western Region (Bultfontein)

| | | | |
|---|---|---|---|
| Senwes | Bultfontein *(Bins)* | Senwes | Tierfontein *(Bins)* |
| Senwes | Losdoorns *(Bins)* | Senwes | Wesselsbron *(Bins)* |
| Senwes | Protespan *(Bins)* | Senwes | Willemsrus *(Bins)* |

## Region 24: Free State Central Region

| | | | |
|---|---|---|---|
| Senwes | Bloemfontein *(Bins)* | Senwes | Petrusburg *(Bins)* |
| Senwes | Brandfort *(Bins)* | Senwes | Theunissen *(Bins)* |
| Senwes | De Brug *(Bins)* | Senwes | Van Tonder *(Bins)* |
| Senwes | Geneva *(Bins)* | Senwes | Welgeleë *(Bins)* |
| Senwes | Hennenman *(Bins)* | Senwes | Winburg *(Bins)* |
| Senwes | Kroonstad *(Bins)* | | |

## Region 25: Free State South Western Region

| | | | |
|---|---|---|---|
| Afgri | Bethlehem *(Bins)* | OVK | Marseilles *(Bins)* |
| Afgri | Slabberts *(Bins)* | OVK | Modderpoort *(Bins)* |
| OVK | Clocolan *(Bins)* | OVK | Tweespruit *(Bins)* |
| OVK | Ficksburg *(Bins)* | OVK | Westminster *(Bins)* |
| OVK | Fouriesburg *(Bins)* | | |

# Grain Production Regions

**Silo/Intake stands per region indicating type of storage structure**

## Region 28: Free State Eastern Region

| | | | |
|---|---|---|---|
| Afgri | Afrikaskop *(Bins/Bunkers)* | VKB | Jim Fouché *(Bins)* |
| Afgri | Eeram *(Bins)* | VKB | Memel *(Bins)* |
| Afgri | Harrismith *(Bins)* | VKB | Reitz *(Bins)* |
| Afgri | Kransfontein (*Bins/Bunkers)* | VKB | Tweeling *(Bins)* |
| VKB | Ascent *(Bins)* | VKB | Villiers *(Bins/Bulk)* |
| VKB | Cornelia *(Bins)* | VKB | Vrede *(Bins)* |
| VKB | Daniëlsrus *(Bins)* | VKB | Warden *(Bins)* |
| VKB | Frankfort *(Bins)* | VKB | Windfield *(Bins)* |

## Region 29: Mpumalanga Southern Region

| | | | |
|---|---|---|---|
| Afgri | Balfour *(Bins)* | Afgri | Leeuspruit *(Bins)* |
| Afgri | Greylingstad *(Bins)* | Afgri | Platrand *(Bins)* |
| Afgri | Grootvlei *(Bins)* | Afgri | Standerton *(Bins)* |
| Afgri | Harvard (*Bins)* | Afgri | Val *(Bins)* |
| VKB | Holmdene *(Bins)* | | |

## Region 32: Mpumalanga Western Region

| | | | |
|---|---|---|---|
| Afgri | Argent *(Bins/Bunkers)* | Afgri | Hawerklip *(Bins)* |
| Afgri | Dryden *(Bins)* | Afgri | Kendal *(Bins)* |
| Afgri | Eloff *(Bins)* | Afgri | Ogies *(Bins)* |
| Afgri | Endicott *(Bins)* | | |

## Region 33: Mpumalanga Northern Region

| | | | |
|---|---|---|---|
| Afgri | Arnot *(Bins)* | Afgri | Middelburg *(Bins)* |
| Afgri | Driefontein *(Bins)* | Afgri | Pan *(Bins)* |
| Afgri | Lydenburg *(Bins)* | Afgri | Stoffberg *(Bins)* |
| Afgri | Marble Hall *(Bins)* | Afgri | Wonderfontein *(Bins)* |

## Region 34: Gauteng Region

| | | | |
|---|---|---|---|
| Afgri | Bloekomspruit *(Bins)* | Afgri | Nigel *(Bins)* |
| Afgri | Bronkhorstspruit *(Bins)* | Afgri | Pretoria Wes *(Bins)* |
| Afgri | Glenroy *(Bins)* | Afgri | Vogelvallei *(Bunkers)* |
| Afgri | Goeie Hoek *(Bins)* | Senwes | Middelvlei *(Bins)* |
| Afgri | Kaalfontein *(Bins)* | Senwes | Oberholzer *(Bins)* |
| Afgri | Kliprivier (Bunkers) | Senwes | Raathsvlei *(Bins)* |
| Afgri | Meyerton (Bunkers) | | |

## Region 35: Limpopo Region

| | | | |
|---|---|---|---|
| Afgri | Northam *(Bins)* | NTK | Nylstroom (Modimolle) *(Bins)* |
| NTK | Alma *(Bins)* | NTK | Potgietersrus (Mokopane) *(Bins)* |
| NTK | Lehau *(Bins)* | NTK | Roedtan *(Bins)* |
| NTK | Naboomspruit (Mookgophong) *(Bins)* | NTK | Settlers *(Bins)* |
| NTK | Nutfield *(Bins)* | NTK | Warmbad (Bela-Bela) *(Bins)* |

## Region 36: KwaZulu-Natal Region

| | | | |
|---|---|---|---|
| Afgri | Bergville *(Bins/Bunkers)* | Afgri | Paulpietersburg *(Bins)* |
| Afgri | Bloedrivier *(Bins)* | Afgri | Pietermaritzburg *(Bins)* |
| Afgri | Dannhauser *(Bins)* | Afgri | Vryheid *(Bins)* |
| Afgri | Dundee *(Bins)* | Afgri | Winterton *(Bins/Bunkers)* |
| Afgri | Mizpah *(Bins)* | | |

# South African Quality data per production region
## WINTER RAINFALL WHEAT

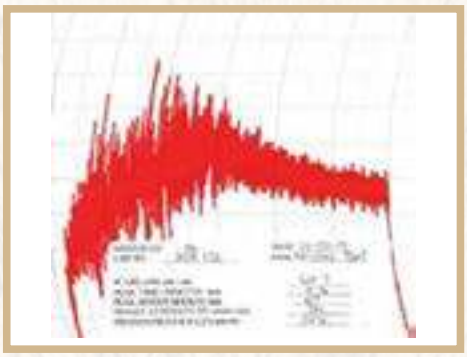
| PRODUCTION REGION | (1) Namakwaland Region | | | | (2) Swartland Western Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 11.9 | 11.2 | 13.1 | 1.07 | 11.6 | 9.8 | 13.2 | 0.93 |
| Falling number, sec | 377 | 367 | 384 | 8.74 | 351 | 305 | 380 | 20.44 |
| 1000 Kernel mass (13% mb), g | 37.8 | 36.3 | 38.6 | 1.30 | 37.0 | 31.3 | 44.8 | 2.83 |
| Hectolitre mass (dirty), kg/hl | 80.5 | 80.0 | 80.9 | 0.46 | 79.4 | 76.4 | 82.7 | 1.63 |
| Screenings (<1.8 mm sieve), % | 4.63 | 4.02 | 5.06 | 0.54 | 2.82 | 0.46 | 4.00 | 0.95 |
| Total damaged kernels, % | 0.37 | 0.30 | 0.44 | 0.07 | 0.78 | 0.06 | 1.34 | 0.37 |
| Combined deviations, % | 5.69 | 5.18 | 6.16 | 0.49 | 4.62 | 1.24 | 7.42 | 1.37 |
| ***Number of samples*** | ***3*** | | | | ***20*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | SST 015 32.0<br>SST 087 23.7<br>SST 88 16.3<br>SST 056 13.7<br>SST 096 10.7 | | | | SST 88 41.8<br>SST 015 26.6<br>SST 056 14.6<br>SST 087 14.4<br>SST 027 2.3 | | | |
| ***Number of samples*** | ***3*** | | | | ***20*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 2.8 | 2.8 | 2.8 | 0.00 | 2.7 | 2.3 | 3.2 | 0.24 |
| Tail height (6 min), mm | 50 | 50 | 50 | 0.00 | 48 | 42 | 52 | 2.50 |
| ***Number of samples*** | ***3*** | | | | ***20*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | - | - | - | - | 69.5 | - | 70.4 | 71.5 | 73.0 | 70.8 | 71.0 | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | - | - | - | - | 11.2 | - | 11.3 | 10.2 | 9.4 | 10.9 | 10.5 | - |
| Ash (db), % | - | - | - | - | 0.59 | - | 0.58 | 0.61 | 0.60 | 0.58 | 0.63 | - |
| Colour, KJ (wet) | - | - | - | - | -4.4 | - | -4.1 | -4.0 | -3.9 | -4.1 | -4.0 | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | - | - | - | - | 94.30 | - | 94.19 | 94.18 | 94.19 | 94.08 | 94.07 | - |
| a* | - | - | - | - | 0.39 | - | 0.42 | 0.37 | 0.39 | 0.41 | 0.40 | - |
| b* | - | - | - | - | 9.95 | - | 10.41 | 10.49 | 9.74 | 11.01 | 10.77 | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | - | - | - | - | 2209 | - | 2093 | 2256 | 2572 | 2051 | 2077 | - |
| Minimum viscosity (Through), cP | - | - | - | - | 1532 | - | 1555 | 1705 | 1831 | 1518 | 1583 | - |
| Final Viscosity, cP | - | - | - | - | 2592 | - | 2456 | 2729 | 3023 | 2474 | 2464 | - |
| Peak Time, min | - | - | - | - | 7.00 | - | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | - | - | - | - | 30.0 | - | 32.1 | 27.7 | 27.0 | 30.1 | 29.9 | - |
| Dry gluten (14% mb), % | - | - | - | - | 10.3 | - | 10.9 | 9.5 | 9.3 | 10.2 | 10.4 | - |
| Gluten Index | - | - | - | - | 95 | - | 95 | 95 | 96 | 94 | 95 | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | - | - | - | - | 60.6 | - | 61.0 | 59.6 | 59.1 | 60.0 | 59.8 | - |
| Development time, min | - | - | - | - | 6.0 | - | 5.2 | 4.0 | 3.2 | 5.0 | 3.8 | - |
| Stability, min | - | - | - | - | 15.7 | - | 8.5 | 7.8 | 5.0 | 8.6 | 6.4 | - |
| Mixing tolerance index, BU | - | - | - | - | 17 | - | 31 | 28 | 52 | 28 | 35 | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | - | - | - | - | 117 | - | 103 | 88 | - | 90 | 76 | - |
| Maximum height, BU | - | - | - | - | 450 | - | 368 | 337 | - | 351 | 302 | - |
| Extensibility, mm | - | - | - | - | 191 | - | 197 | 182 | - | 180 | 174 | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | - | - | - | - | 42.8 | - | 36.9 | 34.7 | 31.3 | 38.8 | 32.6 | - |
| Stability (P), mm | - | - | - | - | 86 | - | 79 | 75 | 85 | 81 | 74 | - |
| Distensibility (L), mm | - | - | - | - | 139 | - | 124 | 137 | 99 | 131 | 128 | - |
| Configuration ratio (P/L) | - | - | - | - | 0.62 | - | 0.64 | 0.55 | 0.86 | 0.62 | 0.58 | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | - | - | - | - | 2.6 | - | 2.5 | 2.4 | 2.1 | 2.6 | 2.3 | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | - | - | - | - | 978 | - | 1013 | 963 | 928 | 997 | 974 | - |
| Evaluation (see page 72) | - | - | - | - | 0 | - | 0 | 0 | 0 | 0 | 0 | - |

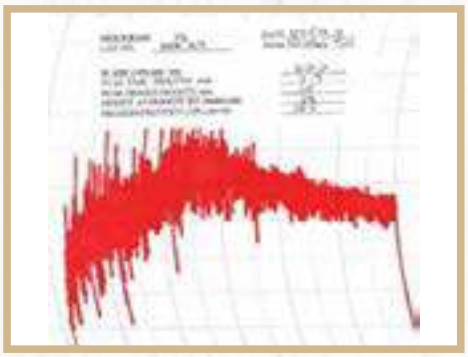
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

1

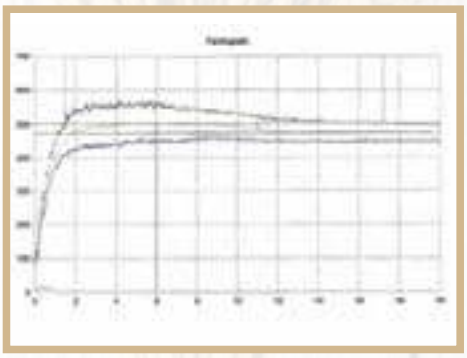


2

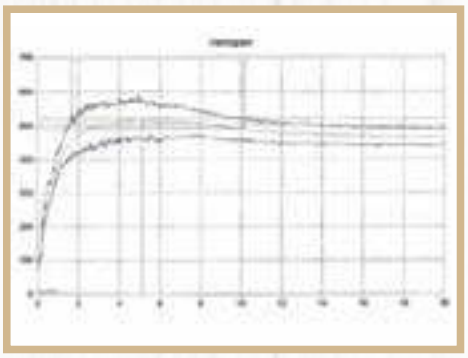


## FARINOGRAM

1

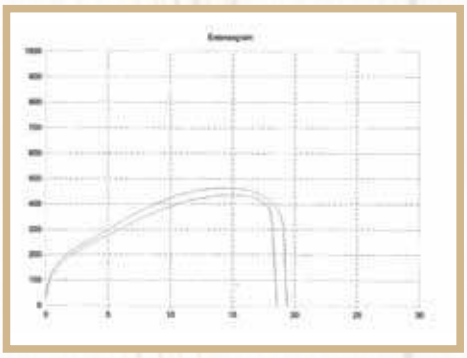


2

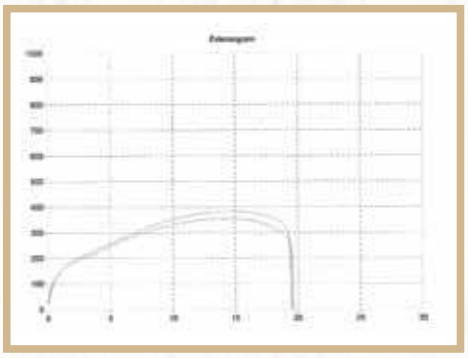


## EXTENSOGRAM

1

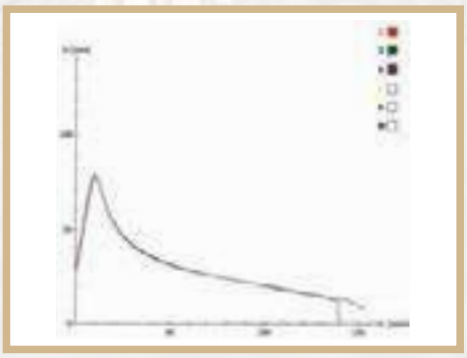


2

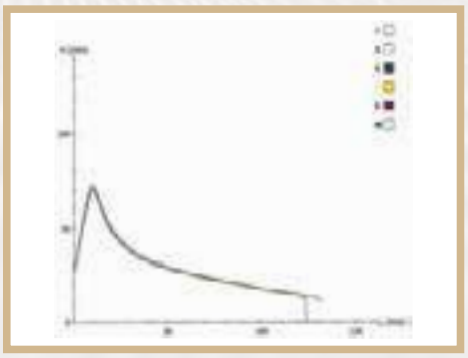


## ALVEOGRAM

1



2



# South African Quality data per production region
## WINTER RAINFALL WHEAT

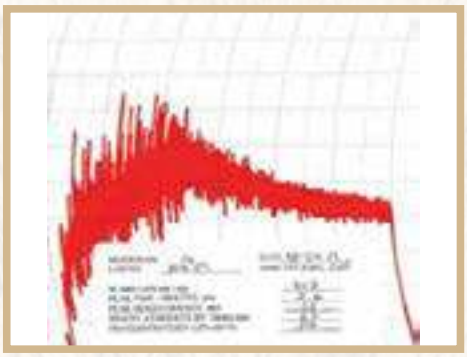
| PRODUCTION REGION | (3) Swartland Central Region | | | | (4) Swartland Eastern Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 11.4 | 8.8 | 13.2 | 0.97 | 11.2 | 8.9 | 13.1 | 0.95 |
| Falling number, sec | 359 | 309 | 409 | 23.14 | 352 | 307 | 386 | 19.25 |
| 1000 Kernel mass (13% mb), g | 39.1 | 33.6 | 45.8 | 2.64 | 39.3 | 33.2 | 45.0 | 3.01 |
| Hectolitre mass (dirty), kg/hl | 81.8 | 74.9 | 84.3 | 1.31 | 82.1 | 79.4 | 85.0 | 1.00 |
| Screenings (<1.8 mm sieve), % | 2.53 | 0.35 | 8.29 | 1.20 | 1.66 | 0.08 | 3.13 | 0.89 |
| Total damaged kernels, % | 0.59 | 0.10 | 1.74 | 0.34 | 0.63 | 0.10 | 1.52 | 0.30 |
| Combined deviations, % | 3.73 | 0.98 | 10.00 | 1.41 | 2.71 | 0.68 | 4.43 | 1.11 |
| ***Number of samples*** | ***77*** | | | | ***30*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | SST 015 30.7<br>SST 087 23.5<br>SST 88 21.5<br>SST 056 18.9<br>SST 096 2.1 | | | | SST 88 28.6<br>SST 015 24.1<br>SST 087 22.7<br>SST 056 15.6<br>SST 027 5.1 | | | |
| ***Number of samples*** | ***77*** | | | | ***30*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 2.4 | 1.8 | 3.0 | 0.22 | 2.5 | 2.2 | 2.8 | 0.20 |
| Tail height (6 min), mm | 47 | 39 | 58 | 3.13 | 47 | 40 | 51 | 2.57 |
| ***Number of samples*** | ***77*** | | | | ***30*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 71.9 | 72.5 | 72.2 | 71.4 | 72.1 | - | 71.2 | 71.9 | 71.8 | 71.9 | 70.3 | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.6 | 10.6 | 9.8 | 8.3 | 10.2 | - | 11.3 | 10.3 | 9.6 | 9.7 | 8.3 | - |
| Ash (db), % | 0.58 | 0.57 | 0.55 | 0.57 | 0.55 | - | 0.56 | 0.56 | 0.57 | 0.58 | 0.56 | - |
| Colour, KJ (wet) | -4.1 | -4.1 | -4.3 | -4.2 | -4.2 | - | -4.2 | -4.2 | -4.2 | -4.2 | -4.0 | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.91 | 93.87 | 94.23 | 94.20 | 94.25 | - | 94.07 | 94.07 | 94.04 | 94.02 | 93.98 | - |
| a* | 0.45 | 0.48 | 0.39 | 0.38 | 0.41 | - | 0.43 | 0.47 | 0.46 | 0.48 | 0.34 | - |
| b* | 11.10 | 10.41 | 9.86 | 10.05 | 9.87 | - | 10.51 | 10.58 | 10.36 | 10.79 | 10.38 | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2054 | 2127 | 2205 | 2246 | 2173 | - | 2147 | 2095 | 2124 | 2105 | 2089 | - |
| Minimum viscosity (Through), cP | 1508 | 1575 | 1660 | 1702 | 1653 | - | 1633 | 1628 | 1635 | 1637 | 1703 | - |
| Final Viscosity, cP | 2447 | 2563 | 2680 | 2719 | 2685 | - | 2590 | 2572 | 2611 | 2613 | 2498 | - |
| Peak Time, min | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 31.7 | 30.0 | 27.6 | 22.3 | 29.4 | - | 31.1 | 28.5 | 26.4 | 26.1 | 20.9 | - |
| Dry gluten (14% mb), % | 10.7 | 10.5 | 9.4 | 7.3 | 10.4 | - | 10.5 | 9.5 | 8.9 | 8.9 | 7.0 | - |
| Gluten Index | 93 | 94 | 95 | 96 | 92 | - | 95 | 90 | 94 | 96 | 95 | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 60.7 | 61.3 | 61.0 | 58.8 | 61.4 | - | 60.5 | 60.7 | 60.5 | 60.0 | 57.7 | - |
| Development time, min | 5.0 | 3.9 | 3.8 | 2.8 | 3.7 | - | 4.9 | 4.2 | 3.2 | 3.3 | 2.5 | - |
| Stability, min | 7.6 | 5.5 | 6.2 | 5.0 | 5.5 | - | 6.7 | 5.4 | 4.9 | 5.0 | 5.5 | - |
| Mixing tolerance index, BU | 33 | 44 | 34 | 46 | 40 | - | 36 | 44 | 44 | 45 | 44 | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 105 | 81 | 69 | 57 | 72 | - | 88 | 76 | 59 | 68 | - | - |
| Maximum height, BU | 366 | 290 | 273 | 269 | 265 | - | 327 | 291 | 243 | 276 | - | - |
| Extensibility, mm | 204 | 192 | 175 | 144 | 185 | - | 188 | 180 | 167 | 171 | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 38.2 | 31.2 | 29.1 | 26.9 | 30.3 | - | 35.6 | 32.0 | 27.7 | 29.7 | 25.7 | - |
| Stability (P), mm | 72 | 72 | 78 | 77 | 77 | - | 73 | 74 | 73 | 73 | 76 | - |
| Distensibility (L), mm | 157 | 135 | 107 | 97 | 114 | - | 141 | 129 | 111 | 118 | 83 | - |
| Configuration ratio (P/L) | 0.46 | 0.53 | 0.73 | 0.79 | 0.68 | - | 0.52 | 0.57 | 0.66 | 0.62 | 0.92 | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.4 | 2.1 | 2.2 | 2.5 | 2.3 | - | 2.2 | 2.1 | 2.2 | 2.3 | 3.0 | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1047 | 984 | 922 | 840 | 977 | - | 1042 | 954 | 898 | 917 | 789 | - |
| Evaluation (see page 72) | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - |

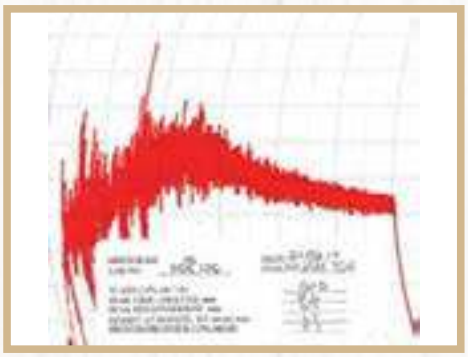
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

3

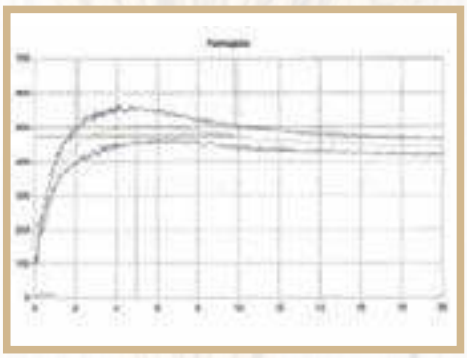


4

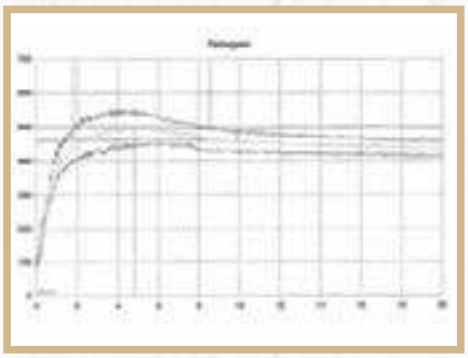


## FARINOGRAM

3

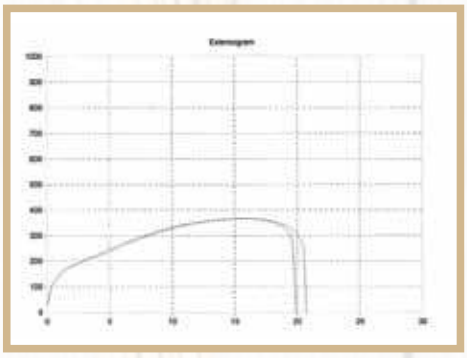


4

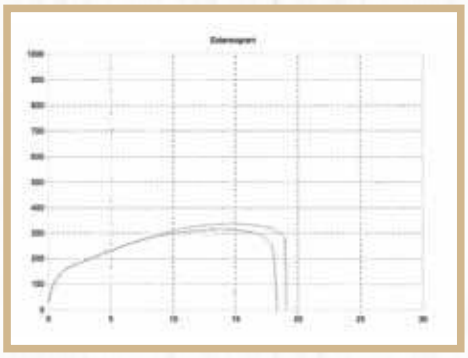


## EXTENSOGRAM

3

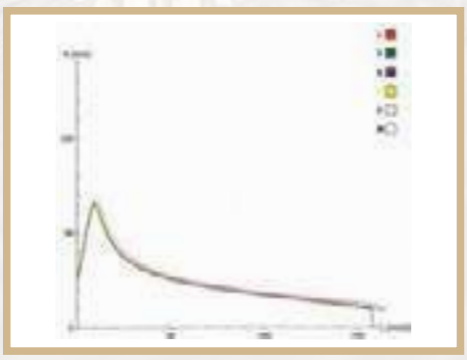


4

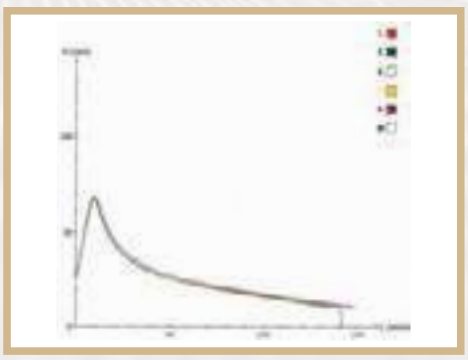


## ALVEOGRAM

3



4



# South African Quality data per production region
## WINTER RAINFALL WHEAT

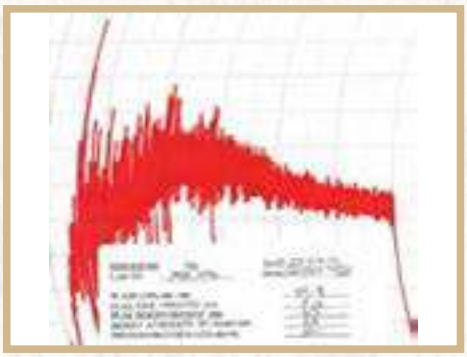
| PRODUCTION REGION | (5) Rûens Western Region | | | | (6) Rûens Eastern Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 11.2 | 9.3 | 13.0 | 1.01 | 11.3 | 9.2 | 13.2 | 1.07 |
| Falling number, sec | 359 | 317 | 391 | 22.37 | 343 | 294 | 400 | 21.25 |
| 1000 Kernel mass (13% mb), g | 40.6 | 35.7 | 47.7 | 2.89 | 43.1 | 39.7 | 49.2 | 2.28 |
| Hectolitre mass (dirty), kg/hl | 80.6 | 78.4 | 82.6 | 1.06 | 80.8 | 78.4 | 82.5 | 1.17 |
| Screenings (<1.8 mm sieve), % | 1.30 | 0.18 | 3.69 | 1.01 | 1.45 | 0.33 | 3.92 | 0.83 |
| Total damaged kernels, % | 0.90 | 0.10 | 2.90 | 0.87 | 1.04 | 0.08 | 4.54 | 0.88 |
| Combined deviations, % | 2.77 | 1.01 | 7.01 | 1.64 | 3.44 | 0.95 | 9.60 | 1.69 |
| ***Number of samples*** | ***20*** | | | | ***24*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | SST 015 | 27.3 | | | SST 087 | 31.3 | | |
| | SST 087 | 26.8 | | | SST 015 | 31.1 | | |
| | SST 056 | 22.9 | | | SST 88 | 21.5 | | |
| | SST 88 | 20.5 | | | SST 056 | 15.9 | | |
| | SST 047 and SST 096 both | 1.3 | | | SST 096 | 0.2 | | |
| ***Number of samples*** | ***20*** | | | | ***24*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 2.5 | 2.2 | 3.0 | 0.24 | 2.3 | 1.9 | 2.6 | 0.20 |
| Tail height (6 min), mm | 47 | 42 | 52 | 3.17 | 47 | 42 | 60 | 4.01 |
| ***Number of samples*** | ***20*** | | | | ***24*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 72.0 | 71.5 | 72.2 | 72.1 | 71.6 | - | 72.9 | 72.7 | 72.6 | 72.7 | 72.0 | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.7 | 10.8 | 10.1 | 8.7 | 10.3 | - | 11.8 | 10.4 | 9.6 | 9.7 | 9.2 | - |
| Ash (db), % | 0.59 | 0.55 | 0.58 | 0.59 | 0.62 | - | 0.58 | 0.57 | 0.58 | 0.60 | 0.60 | - |
| Colour, KJ (wet) | -3.8 | -4.0 | -3.7 | -3.8 | -4.0 | - | -4.0 | -3.8 | -3.8 | -3.7 | -4.0 | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.79 | 94.18 | 93.84 | 93.82 | 94.11 | - | 94.03 | 93.76 | 93.89 | 93.65 | 93.92 | - |
| a* | 0.54 | 0.42 | 0.50 | 0.44 | 0.41 | - | 0.47 | 0.53 | 0.57 | 0.49 | 0.39 | - |
| b* | 10.78 | 10.33 | 10.64 | 11.65 | 9.75 | - | 9.27 | 10.22 | 9.49 | 10.97 | 9.60 | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2163 | 2207 | 2195 | 2237 | 2281 | - | 2110 | 2242 | 2203 | 2213 | 2335 | - |
| Minimum viscosity (Through), cP | 1567 | 1626 | 1578 | 1760 | 1639 | - | 1591 | 1779 | 1699 | 1706 | 1802 | - |
| Final Viscosity, cP | 2516 | 2631 | 2557 | 2663 | 2646 | - | 2516 | 2602 | 2589 | 2572 | 2777 | - |
| Peak Time, min | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 31.7 | 29.1 | 27.9 | 22.5 | 28.8 | - | 34.2 | 28.7 | 26.3 | 26.4 | 24.9 | - |
| Dry gluten (14% mb), % | 11.0 | 10.0 | 9.4 | 7.9 | 9.8 | - | 11.7 | 9.4 | 8.9 | 8.7 | 8.3 | - |
| Gluten Index | 97 | 96 | 96 | 95 | 95 | - | 88 | 92 | 93 | 91 | 89 | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 61.3 | 60.7 | 59.8 | 57.3 | 59.4 | - | 62.5 | 60.4 | 60.2 | 59.7 | 59.9 | - |
| Development time, min | 5.0 | 4.4 | 3.8 | 2.7 | 3.5 | - | 4.7 | 3.2 | 2.8 | 2.7 | 2.3 | - |
| Stability, min | 7.7 | 6.9 | 5.4 | 4.8 | 6.4 | - | 6.0 | 4.6 | 3.7 | 4.5 | 3.7 | - |
| Mixing tolerance index, BU | 35 | 36 | 50 | 51 | 36 | - | 46 | 52 | 59 | 59 | 57 | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 94 | 97 | 85 | 68 | 82 | - | 75 | 65 | 55 | 64 | 53 | - |
| Maximum height, BU | 341 | 351 | 321 | 296 | 304 | - | 259 | 256 | 227 | 274 | 228 | - |
| Extensibility, mm | 194 | 197 | 186 | 159 | 188 | - | 199 | 173 | 161 | 159 | 155 | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 36.7 | 29.1 | 31.0 | 24.0 | 33.0 | - | 33.9 | 27.9 | 24.8 | 27.8 | 25.8 | - |
| Stability (P), mm | 75 | 71 | 73 | 64 | 73 | - | 74 | 66 | 70 | 71 | 71 | - |
| Distensibility (L), mm | 151 | 122 | 130 | 113 | 128 | - | 148 | 138 | 107 | 121 | 117 | - |
| Configuration ratio (P/L) | 0.50 | 0.58 | 0.56 | 0.57 | 0.57 | - | 0.50 | 0.48 | 0.65 | 0.59 | 0.61 | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.2 | 2.4 | 2.3 | 2.4 | 2.4 | - | 1.9 | 2.2 | 2.1 | 2.2 | 2.0 | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1072 | 1007 | 942 | 879 | - | - | 1078 | 963 | 919 | 901 | 903 | - |
| Evaluation (see page 72) | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 | 0 | - |

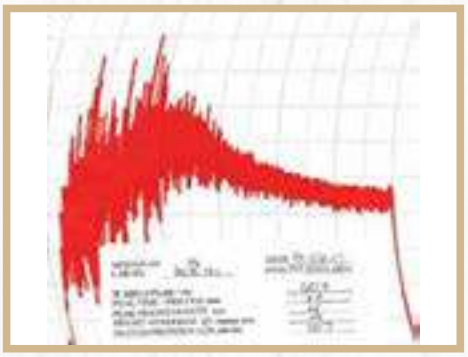
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

5

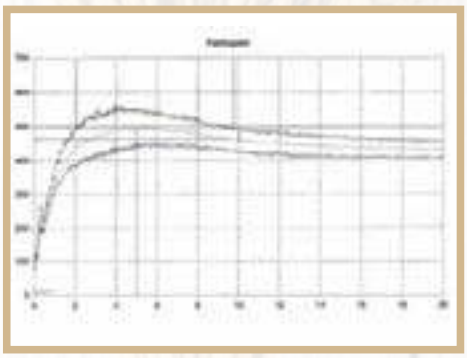


6

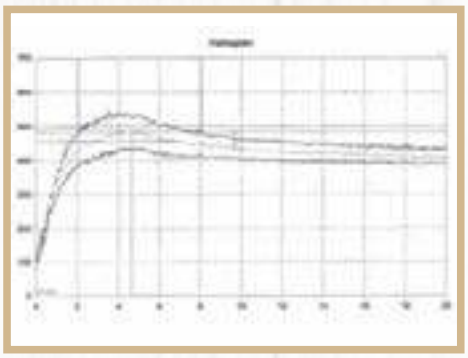


## FARINOGRAM

5

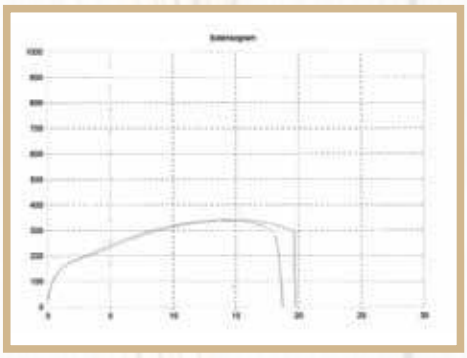


6

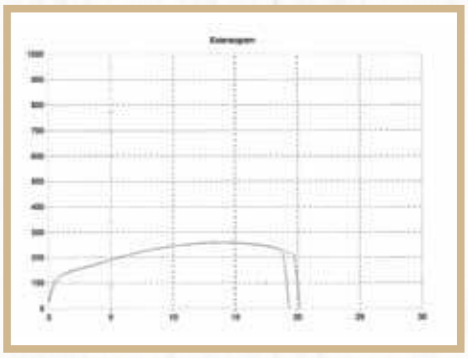


## EXTENSOGRAM

5

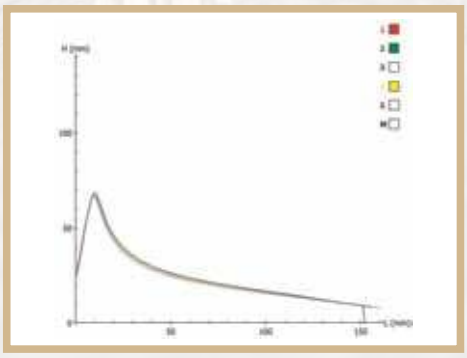


6

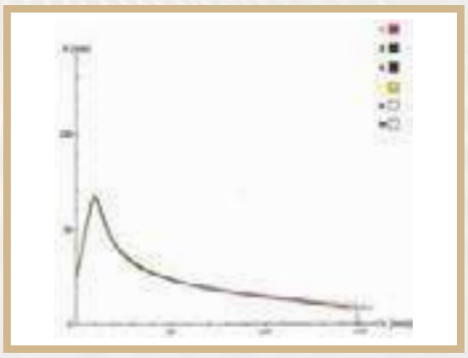


## ALVEOGRAM

5



6



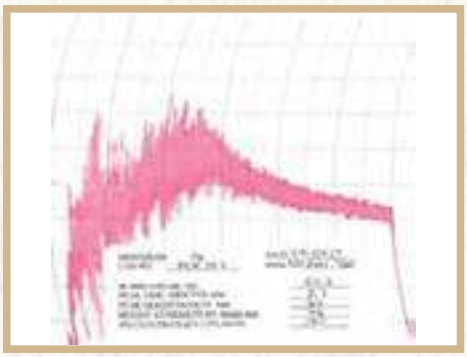
# South African Quality data per production region
## IRRIGATION WHEAT

| PRODUCTION REGION | (10) Griqualand-West Region | | | | | | (11) Vaalharts Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Protein (12% mb), % | 12.0 | 9.3 | 13.0 | 0.82 | | | 12.6 | 11.2 | 13.5 | 0.76 | | |
| Falling number, sec | 361 | 332 | 494 | 27.53 | | | 397 | 362 | 450 | 34.28 | | |
| 1000 Kernel mass (13% mb), g | 38.1 | 30.6 | 43.9 | 2.51 | | | 39.5 | 33.4 | 43.2 | 3.48 | | |
| Hectolitre mass (dirty), kg/hl | 84.3 | 81.3 | 86.0 | 1.25 | | | 81.2 | 74.5 | 83.5 | 3.33 | | |
| Screenings (<1.8 mm sieve), % | 1.43 | 0.14 | 4.54 | 1.02 | | | 2.07 | 0.39 | 7.39 | 2.67 | | |
| Total damaged kernels, % | 0.39 | 0.06 | 1.80 | 0.38 | | | 0.53 | 0.18 | 0.90 | 0.29 | | |
| Combined deviations, % | 2.34 | 0.34 | 6.32 | 1.34 | | | 3.33 | 0.94 | 11.01 | 3.82 | | |
| ***Number of samples*** | ***38*** | | | | | | ***6*** | | | | | |
| **CULTIVARS** | | | | | | | | | | | | |
| | SST 875 | 32.1 | | | | | PAN 3471 | 36.3 | | | | |
| cultivars | SST 884 | 29.6 | | | | | SST 875 | 28.0 | | | | |
| with highest % | PAN 3471 | 26.2 | | | | | SST 884 | 19.7 | | | | |
| occurrence | SST 835 | 4.0 | | | | | SST 843 | 5.2 | | | | |
| | PAN 3400 | 3.4 | | | | | PAN 3400 | 4.7 | | | | |
| ***Number of samples*** | ***38*** | | | | | | ***6*** | | | | | |
| **MIXOGRAM (Quadromat Junior)** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Peak time, min | 2.7 | 2.0 | 4.2 | 0.43 | | | 2.7 | 2.4 | 3.3 | 0.30 | | |
| Tail height (6 min), mm | 44 | 35 | 51 | 3.76 | | | 48 | 45 | 51 | 1.97 | | |
| ***Number of samples*** | ***38*** | | | | | | ***6*** | | | | | |
| | **COMPOSITE SAMPLES** | | | | | | | | | | | |
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 74.0 | 73.3 | 74.2 | 74.0 | 74.7 | - | 73.8 | 75.1 | - | - | - | 73.1 |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.6 | 10.5 | 9.5 | 9.6 | 11.0 | - | 11.8 | 10.9 | - | - | - | 12.6 |
| Ash (db), % | 0.61 | 0.63 | 0.62 | 0.61 | 0.64 | - | 0.60 | 0.59 | - | - | - | 0.62 |
| Colour, KJ (wet) | -4.2 | -4.2 | -4.3 | -4.3 | -4.2 | - | -4.1 | -4.1 | - | - | - | -3.4 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.94 | 93.88 | 94.01 | 94.21 | 93.79 | - | 93.90 | 93.72 | - | - | - | 93.38 |
| a* | 0.55 | 0.53 | 0.50 | 0.43 | 0.52 | - | 0.48 | 0.48 | - | - | - | 0.44 |
| b* | 9.86 | 9.83 | 10.27 | 9.62 | 9.67 | - | 9.70 | 10.49 | - | - | - | 10.15 |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2499 | 2501 | 2423 | 2714 | 2517 | - | 2375 | 2327 | - | - | - | 2430 |
| Minimum viscosity (Through), cP | 1873 | 1871 | 1917 | 2077 | 1958 | - | 1713 | 1782 | - | - | - | 1873 |
| Final Viscosity, cP | 2801 | 2761 | 2755 | 3042 | 2769 | - | 2668 | 2575 | - | - | - | 2595 |
| Peak Time, min | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | - | 7.00 | 7.00 | - | - | - | 7.00 |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 32.2 | 30.6 | 25.7 | 25.0 | 31.1 | - | 32.1 | 29.7 | - | - | - | 34.3 |
| Dry gluten (14% mb), % | 11.2 | 10.0 | 8.6 | 8.5 | 10.5 | - | 11.0 | 10.2 | - | - | - | 12.0 |
| Gluten Index | 97 | 94 | 97 | 99 | 95 | - | 94 | 96 | - | - | - | 96 |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 60.7 | 60.4 | 57.8 | 56.3 | 58.1 | - | 60.0 | 58.0 | - | - | - | 59.7 |
| Development time, min | 5.7 | 5.8 | 5.5 | 3.5 | 4.8 | - | 5.2 | 4.3 | - | - | - | 6.5 |
| Stability, min | 7.7 | 7.3 | 7.0 | 8.0 | 5.7 | - | 7.7 | 6.1 | - | - | - | 9.3 |
| Mixing tolerance index, BU | 38 | 39 | 49 | 29 | 52 | - | 38 | 44 | - | - | - | 34 |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 109 | 108 | 86 | 90 | 104 | - | 115 | 90 | - | - | - | 126 |
| Maximum height, BU | 409 | 416 | 373 | 409 | 408 | - | 394 | 326 | - | - | - | 420 |
| Extensibility, mm | 196 | 191 | 166 | 160 | 185 | - | 215 | 195 | - | - | - | 217 |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 39.5 | 35.2 | 30.1 | 32.4 | 34.0 | - | 39.4 | 31.0 | - | - | - | 37.8 |
| Stability (P), mm | 70 | 76 | 64 | 60 | 63 | - | 67 | 57 | - | - | - | 71 |
| Distensibility (L), mm | 155 | 117 | 127 | 152 | 148 | - | 169 | 153 | - | - | - | 120 |
| Configuration ratio (P/L) | 0.45 | 0.65 | 0.50 | 0.39 | 0.43 | - | 0.40 | 0.37 | - | - | - | 0.59 |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.3 | 2.5 | 2.8 | 3.0 | 2.4 | - | 2.5 | 2.3 | - | - | - | 2.9 |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1141 | 994 | 976 | 1002 | 1115 | - | 1089 | 1076 | - | - | - | 1167 |
| Evaluation (see page 72) | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | - | - | - | 0 |

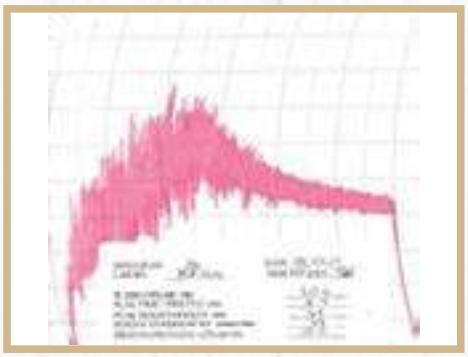
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

10

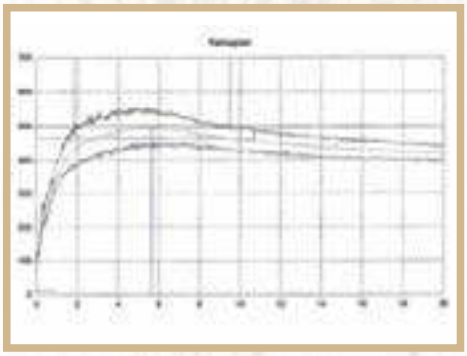


11

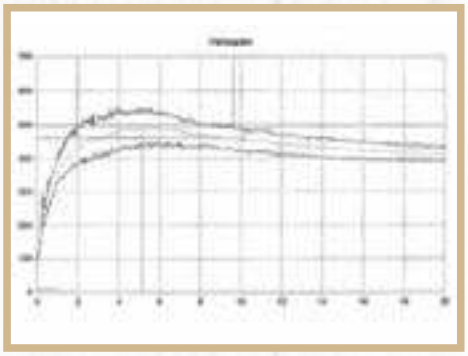


## FARINOGRAM

10

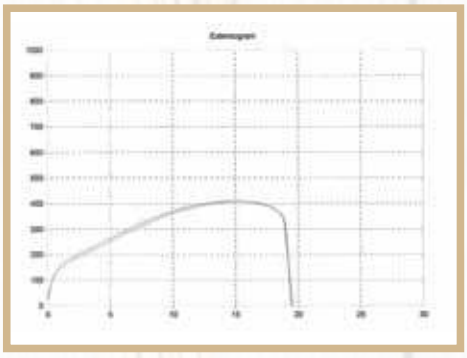


11

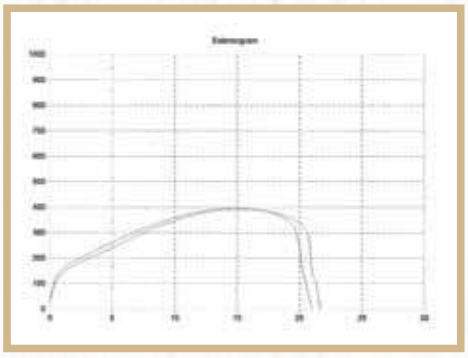


## EXTENSOGRAM

10

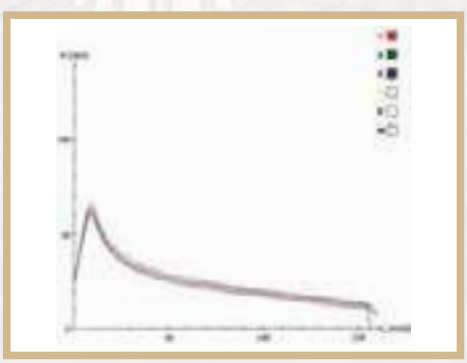


11

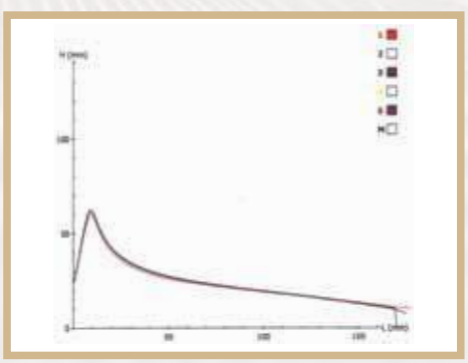


## ALVEOGRAM

10



11



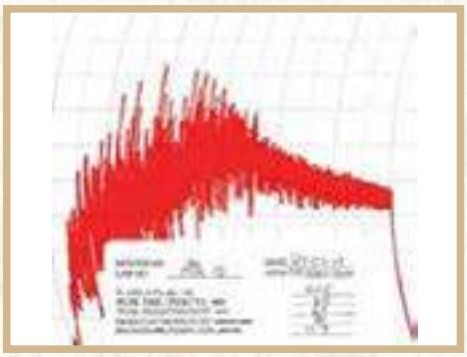
# South African Quality data per production region
## IRRIGATION WHEAT

| PRODUCTION REGION | (12) North-West Western Region | | | | | | (14) North-West Southern Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Protein (12% mb), % | 12.8 | 11.9 | 14.3 | 1.05 | | | 13.0 | 11.8 | 14.7 | 0.84 | | |
| Falling number, sec | 360 | 299 | 401 | 46.35 | | | 371 | 355 | 408 | 17.22 | | |
| 1000 Kernel mass (13% mb), g | 36.2 | 32.6 | 44.6 | 5.63 | | | 37.0 | 32.0 | 41.4 | 2.89 | | |
| Hectolitre mass (dirty), kg/hl | 82.1 | 79.7 | 84.6 | 2.44 | | | 82.9 | 81.1 | 85.6 | 1.32 | | |
| Screenings (<1.8 mm sieve), % | 2.28 | 0.25 | 3.58 | 1.43 | | | 1.54 | 0.38 | 2.22 | 0.65 | | |
| Total damaged kernels, % | 0.85 | 0.28 | 1.68 | 0.66 | | | 0.32 | 0.14 | 0.44 | 0.10 | | |
| Combined deviations, % | 3.50 | 1.65 | 4.88 | 1.37 | | | 2.31 | 1.12 | 3.12 | 0.70 | | |
| ***Number of samples*** | ***4*** | | | | | | ***8*** | | | | | |
| **CULTIVARS** | | | | | | | | | | | | |
| | SST 875 | 27.5 | | | | | SST 884 | 41.9 | | | | |
| cultivars | PAN 3471 | 25.0 | | | | | SST 843 | 20.0 | | | | |
| with highest % | SST 835 | 18.3 | | | | | SST 875 | 14.6 | | | | |
| occurrence | SST 884 | 15.8 | | | | | KROKODIL | 14.3 | | | | |
| | DUZI | 7.3 | | | | | SST 835 | 5.4 | | | | |
| ***Number of samples*** | ***4*** | | | | | | ***8*** | | | | | |
| **MIXOGRAM (Quadromat Junior)** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Peak time, min | 3.1 | 2.5 | 3.4 | 0.40 | | | 2.6 | 1.9 | 2.9 | 0.31 | | |
| Tail height (6 min), mm | 50 | 48 | 51 | 1.73 | | | 51 | 49 | 52 | 1.04 | | |
| ***Number of samples*** | ***4*** | | | | | | ***8*** | | | | | |
| | **COMPOSITE SAMPLES** | | | | | | | | | | | |
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 73.3 | - | - | 74.0 | - | - | 71.2 | 72.3 | - | - | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 12.2 | - | - | 10.8 | - | - | 12.3 | 11.1 | - | - | - | - |
| Ash (db), % | 0.60 | - | - | 0.59 | - | - | 0.60 | 0.67 | - | - | - | - |
| Colour, KJ (wet) | -3.5 | - | - | -4.0 | - | - | -3.9 | -4.1 | - | - | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.45 | - | - | 94.03 | - | - | 93.70 | 93.69 | - | - | - | - |
| a* | 0.48 | - | - | 0.46 | - | - | 0.48 | 0.56 | - | - | - | - |
| b* | 10.16 | - | - | 9.43 | - | - | 9.54 | 9.70 | - | - | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2388 | - | - | 2740 | - | - | 2224 | 2392 | - | - | - | - |
| Minimum viscosity (Through), cP | 1765 | - | - | 2086 | - | - | 1699 | 1794 | - | - | - | - |
| Final Viscosity, cP | 2722 | - | - | 3052 | - | - | 2458 | 2630 | - | - | - | - |
| Peak Time, min | 7.00 | - | - | 7.00 | - | - | 7.00 | 7.00 | - | - | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 32.8 | - | - | 27.8 | - | - | 35.2 | 32.4 | - | - | - | - |
| Dry gluten (14% mb), % | 11.2 | - | - | 10.1 | - | - | 12.1 | 10.7 | - | - | - | - |
| Gluten Index | 95 | - | - | 99 | - | - | 97 | 92 | - | - | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 60.3 | - | - | 57.0 | - | - | 61.8 | 61.3 | - | - | - | - |
| Development time, min | 6.5 | - | - | 6.5 | - | - | 5.7 | 6.3 | - | - | - | - |
| Stability, min | 9.4 | - | - | 10.3 | - | - | 8.1 | 8.0 | - | - | - | - |
| Mixing tolerance index, BU | 33 | - | - | 32 | - | - | 37 | 41 | - | - | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 123 | - | - | 147 | - | - | 94 | 102 | - | - | - | - |
| Maximum height, BU | 406 | - | - | 540 | - | - | 347 | 433 | - | - | - | - |
| Extensibility, mm | 222 | - | - | 203 | - | - | 190 | 173 | - | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 41.0 | - | - | 41.8 | - | - | 41.5 | 34.3 | - | - | - | - |
| Stability (P), mm | 68 | - | - | 63 | - | - | 77 | 92 | - | - | - | - |
| Distensibility (L), mm | 170 | - | - | 173 | - | - | 144 | 80 | - | - | - | - |
| Configuration ratio (P/L) | 0.40 | - | - | 0.36 | - | - | 0.53 | 1.15 | - | - | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.8 | - | - | 3.1 | - | - | 2.4 | 2.5 | - | - | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1159 | - | - | 1112 | - | - | 1131 | 1017 | - | - | - | - |
| Evaluation (see page 72) | 0 | - | - | 0 | - | - | 0 | 0 | - | - | - | - |

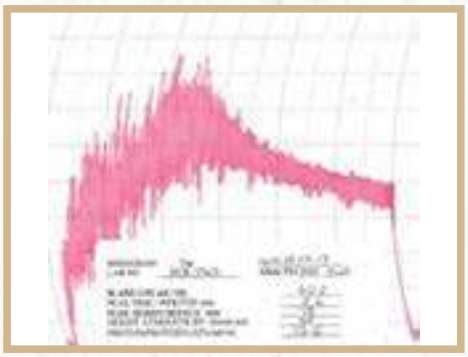
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

12

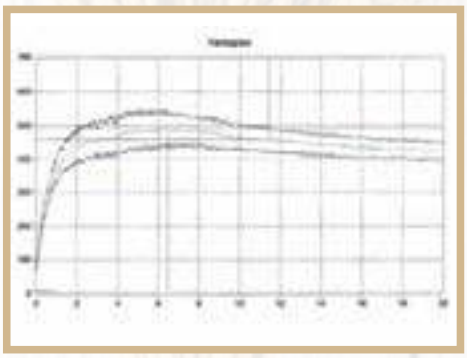


14

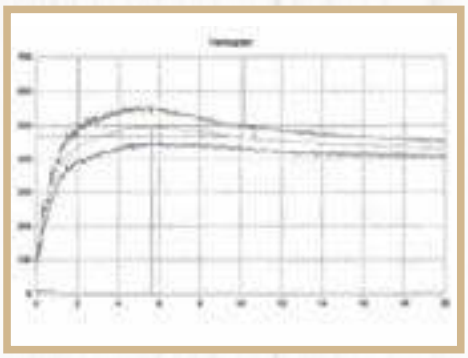


## FARINOGRAM

12

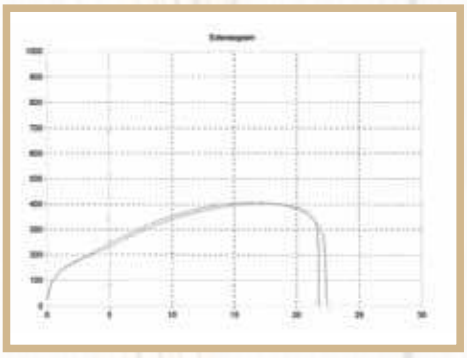


14

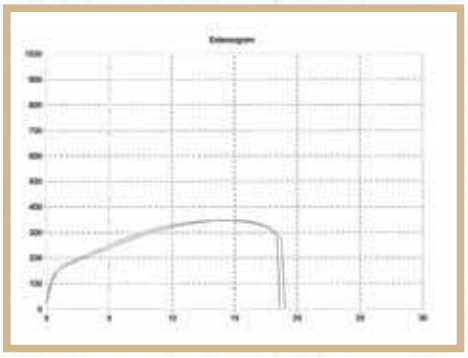


## EXTENSOGRAM

12

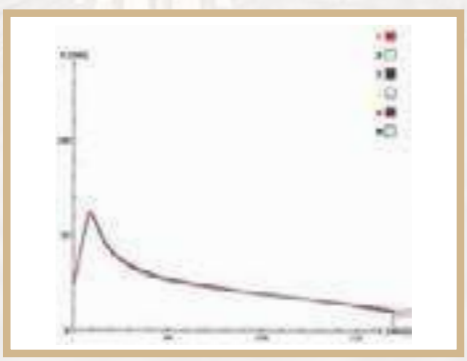


14

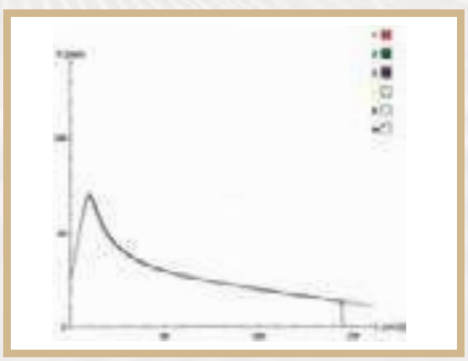


## ALVEOGRAM

12



14



# South African Quality data per production region
## IRRIGATION WHEAT

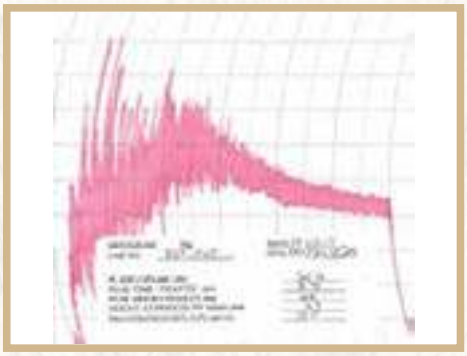
| PRODUCTION REGION | (17) North-West Central Northern Region (Ottosdal) | | | | (19) North-West Central Region (Lichtenburg) | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 11.4 | 11.0 | 12.1 | 0.51 | 12.3 | 9.5 | 13.9 | 1.27 |
| Falling number, sec | 373 | 349 | 387 | 17.29 | 388 | 315 | 555 | 57.80 |
| 1000 Kernel mass (13% mb), g | 43.2 | 41.1 | 44.9 | 1.58 | 38.4 | 33.0 | 43.7 | 3.54 |
| Hectolitre mass (dirty), kg/hl | 81.4 | 80.6 | 82.3 | 0.76 | 81.9 | 79.4 | 85.9 | 1.74 |
| Screenings (<1.8 mm sieve), % | 1.08 | 0.68 | 1.70 | 0.44 | 1.27 | 0.33 | 2.16 | 0.63 |
| Total damaged kernels, % | 1.60 | 0.40 | 2.42 | 0.99 | 0.77 | 0.24 | 1.46 | 0.45 |
| Combined deviations, % | 3.05 | 1.83 | 4.54 | 1.25 | 2.55 | 1.77 | 3.04 | 0.40 |
| ***Number of samples*** | ***4*** | | | | ***13*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | SST 884 24.0<br>SST 875 16.5<br>SST 835 15.5<br>SST 895 14.5<br>SST 087 9.0 | | | | SST 884 35.5<br>SST 843 31.5<br>SST 875 19.0<br>SST 835 3.9<br>KROKODIL 3.2 | | | |
| ***Number of samples*** | ***4*** | | | | ***13*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 2.5 | 2.4 | 2.7 | 0.14 | 3.2 | 2.3 | 4.5 | 0.80 |
| Tail height (6 min), mm | 48 | 46 | 50 | 1.83 | 49 | 42 | 58 | 5.87 |
| ***Number of samples*** | ***4*** | | | | ***13*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 72.9 | 73.7 | - | - | 73.3 | - | 72.7 | 73.0 | - | 76.7 | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 10.3 | 10.8 | - | - | 10.3 | - | 12.1 | 10.8 | - | 8.5 | - | - |
| Ash (db), % | 0.65 | 0.63 | - | - | 0.58 | - | 0.60 | 0.64 | - | 0.60 | - | - |
| Colour, KJ (wet) | -3.8 | -3.9 | - | - | -3.8 | - | -3.8 | -4.1 | - | -4.1 | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.69 | 93.69 | - | - | 93.84 | - | 93.85 | 93.88 | - | 93.90 | - | - |
| a* | 0.51 | 0.48 | - | - | 0.39 | - | 0.45 | 0.48 | - | 0.46 | - | - |
| b* | 9.79 | 9.77 | - | - | 9.80 | - | 9.20 | 9.56 | - | 10.95 | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2349 | 2545 | - | - | 2244 | - | 2696 | 2399 | - | 2508 | - | - |
| Minimum viscosity (Through), cP | 1754 | 1947 | - | - | 1711 | - | 1992 | 1761 | - | 2177 | - | - |
| Final Viscosity, cP | 2631 | 2789 | - | - | 2619 | - | 2938 | 2666 | - | 2847 | - | - |
| Peak Time, min | 7.00 | 7.00 | - | - | 7.00 | - | 7.00 | 7.00 | - | 6.80 | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 31.7 | 29.4 | - | - | 28.5 | - | 31.3 | 29.2 | - | 23.3 | - | - |
| Dry gluten (14% mb), % | 10.9 | 10.1 | - | - | 9.6 | - | 10.9 | 9.9 | - | 7.4 | - | - |
| Gluten Index | 94 | 98 | - | - | 96 | - | 97 | 96 | - | 96 | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 60.7 | 58.9 | - | - | 60.3 | - | 59.9 | 59.4 | - | 55.0 | - | - |
| Development time, min | 5.0 | 5.8 | - | - | 3.6 | - | 7.3 | 5.5 | - | 2.2 | - | - |
| Stability, min | 6.7 | 7.8 | - | - | 5.4 | - | 10.9 | 8.3 | - | 4.3 | - | - |
| Mixing tolerance index, BU | 46 | 42 | - | - | 46 | - | 33 | 36 | - | 71 | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 95 | 101 | - | - | 73 | - | 143 | 115 | - | - | - | - |
| Maximum height, BU | 349 | 408 | - | - | 289 | - | 487 | 432 | - | - | - | - |
| Extensibility, mm | 191 | 181 | - | - | 171 | - | 216 | 195 | - | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 39.0 | 36.9 | - | - | 29.4 | - | 48.0 | 38.8 | - | 22.2 | - | - |
| Stability (P), mm | 83 | 73 | - | - | 70 | - | 74 | 72 | - | 52 | - | - |
| Distensibility (L), mm | 121 | 120 | - | - | 128 | - | 160 | 140 | - | 121 | - | - |
| Configuration ratio (P/L) | 0.69 | 0.61 | - | - | 0.55 | - | 0.46 | 0.51 | - | 0.43 | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.3 | 2.8 | - | - | 2.3 | - | 3.3 | 2.8 | - | 2.8 | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1043 | 1033 | - | - | 985 | - | 1151 | 1015 | - | 960 | - | - |
| Evaluation (see page 72) | 0 | 0 | - | - | 0 | - | 0 | 0 | - | 0 | - | - |

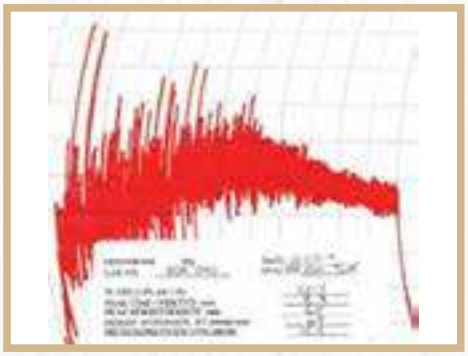
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

17

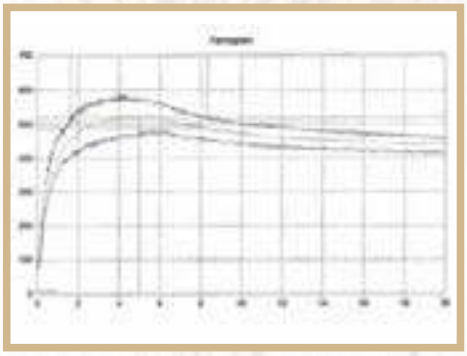


19

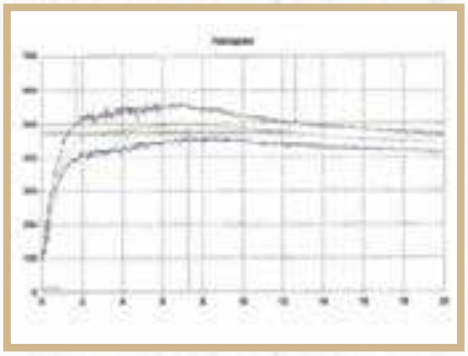


## FARINOGRAM

17

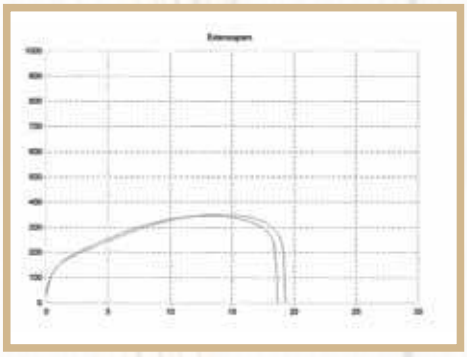


19

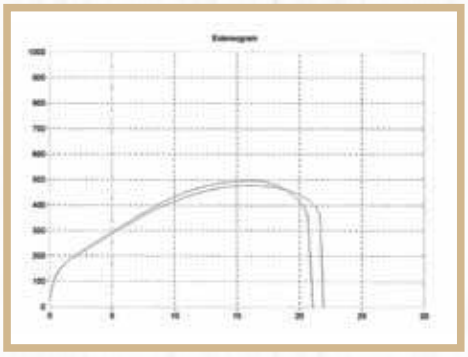


## EXTENSOGRAM

17

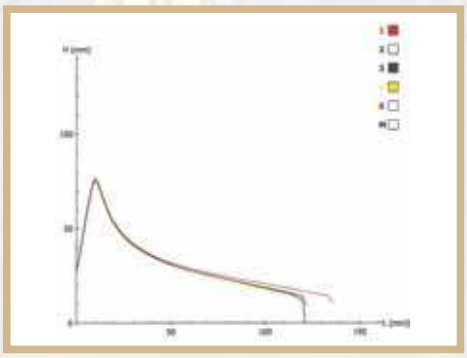


19

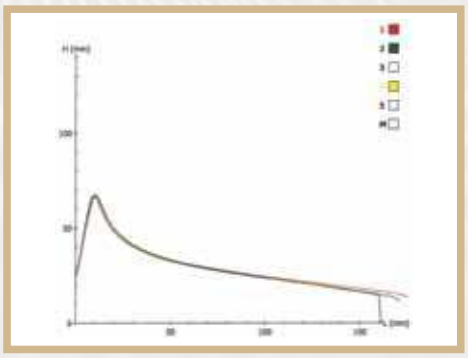


## ALVEOGRAM

17



19



# South African Quality data per production region

## IRRIGATION WHEAT

## SUMMER RAINFALL AND IRRIGATION WHEAT

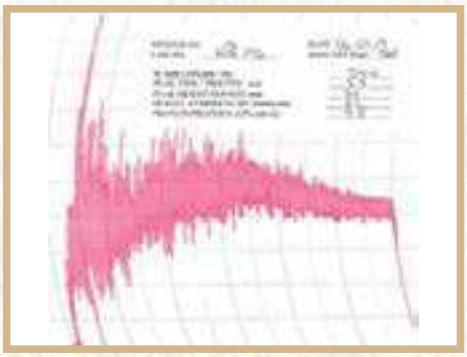
| PRODUCTION REGION | (20) North-West Eastern Region | | | | (22) Free-State North-Western Region (Bothaville) | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 12.2 | 9.5 | 14.7 | 1.26 | 15.8 | 13.2 | 17.3 | 2.24 |
| Falling number, sec | 373 | 315 | 493 | 50.94 | 349 | 310 | 399 | 45.39 |
| 1000 Kernel mass (13% mb), g | 37.6 | 31.1 | 42.6 | 3.47 | 37.0 | 35.0 | 38.7 | 1.87 |
| Hectolitre mass (dirty), kg/hl | 81.7 | 76.3 | 84.9 | 2.06 | 78.7 | 77.2 | 80.7 | 1.79 |
| Screenings (<1.8 mm sieve), % | 2.18 | 0.51 | 8.54 | 1.96 | 1.87 | 1.01 | 3.30 | 1.24 |
| Total damaged kernels, % | 0.54 | 0.12 | 1.30 | 0.34 | 1.45 | 1.12 | 2.00 | 0.48 |
| Combined deviations, % | 3.33 | 1.31 | 11.02 | 2.32 | 4.01 | 2.43 | 5.92 | 1.77 |
| ***Number of samples*** | ***15*** | | | | ***3*** | | | |
| **CULTIVARS** | | | | | | | | |
| | SST 843 | 35.3 | | | PAN 3161 | 33.3 | | |
| cultivars | SST 884 | 16.7 | | | SST 387 | 33.3 | | |
| with highest % | SST 875 | 14.7 | | | SST 875 | 20.3 | | |
| occurrence | SST 835 | 13.5 | | | PAN 3471 | 13.0 | | |
| | DUZI | 11.9 | | | | | | |
| ***Number of samples*** | ***15*** | | | | ***3*** | | | |
| **MIXOGRAM (Quadromat Junior)** | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 3.4 | 2.4 | 4.4 | 0.60 | 2.7 | 2.4 | 2.9 | 0.29 |
| Tail height (6 min), mm | 47 | 10 | 60 | 11.12 | 53 | 49 | 57 | 4.04 |
| ***Number of samples*** | ***15*** | | | | ***3*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 73.4 | 74.7 | 74.3 | 74.0 | - | - | 72.9 | - | - | - | 70.9 | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 12.3 | 10.5 | 9.7 | 10.5 | - | - | 13.8 | - | - | - | 15.8 | - |
| Ash (db), % | 0.57 | 0.55 | 0.61 | 0.63 | - | - | 0.58 | - | - | - | 0.64 | - |
| Colour, KJ (wet) | -3.8 | -4.0 | -4.0 | -4.1 | - | - | -3.5 | - | - | - | -2.7 | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.71 | 93.81 | 93.75 | 93.94 | - | - | 93.36 | - | - | - | 92.63 | - |
| a* | 0.44 | 0.44 | 0.46 | 0.45 | - | - | 0.49 | - | - | - | 0.48 | - |
| b* | 9.68 | 9.99 | 10.70 | 9.91 | - | - | 10.79 | - | - | - | 10.28 | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2482 | 2328 | 2520 | 2489 | - | - | 2191 | - | - | - | 2039 | - |
| Minimum viscosity (Through), cP | 1868 | 1801 | 1947 | 1908 | - | - | 1640 | - | - | - | 1519 | - |
| Final Viscosity, cP | 2746 | 2572 | 2885 | 2835 | - | - | 2361 | - | - | - | 2222 | - |
| Peak Time, min | 7.00 | 7.00 | 7.00 | 7.00 | - | - | 7.00 | - | - | - | 7.00 | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 31.3 | 28.2 | 25.5 | 21.8 | - | - | 38.7 | - | - | - | 45.5 | - |
| Dry gluten (14% mb), % | 11.2 | 10.0 | 8.6 | 7.1 | - | - | 13.1 | - | - | - | 15.5 | - |
| Gluten Index | 99 | 97 | 96 | 94 | - | - | 93 | - | - | - | 85 | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 58.9 | 57.6 | 56.2 | 54.2 | - | - | 63.4 | - | - | - | 65.3 | - |
| Development time, min | 7.7 | 5.2 | 4.9 | 1.7 | - | - | 5.7 | - | - | - | 9.3 | - |
| Stability, min | 14.4 | 7.0 | 7.1 | 6.7 | - | - | 8.7 | - | - | - | 15.8 | - |
| Mixing tolerance index, BU | 21 | 48 | 45 | 27 | - | - | 25 | - | - | - | 15 | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 153 | 88 | 89 | 76 | - | - | 114 | - | - | - | 141 | - |
| Maximum height, BU | 493 | 349 | 356 | 371 | - | - | 351 | - | - | - | 385 | - |
| Extensibility, mm | 231 | 179 | 179 | 144 | - | - | 236 | - | - | - | 269 | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 52.0 | 32.5 | 28.9 | 23.9 | - | - | 46.6 | - | - | - | 59.5 | - |
| Stability (P), mm | 70 | 56 | 56 | 56 | - | - | 71 | - | - | - | 89 | - |
| Distensibility (L), mm | 180 | 170 | 145 | 120 | - | - | 178 | - | - | - | 144 | - |
| Configuration ratio (P/L) | 0.39 | 0.33 | 0.39 | 0.47 | - | - | 0.40 | - | - | - | 0.62 | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 3.4 | 3.0 | 2.9 | 3.4 | - | - | 2.4 | - | - | - | 2.6 | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1164 | 1056 | 1026 | 855 | - | - | 1151 | - | - | - | 1270 | - |
| Evaluation (see page 72) | 0 | 0 | 0 | 0 | - | - | 0 | - | - | - | 0 | - |

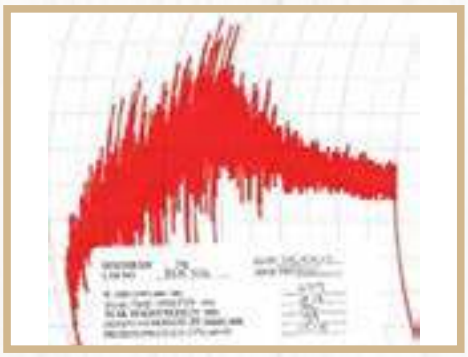
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

20

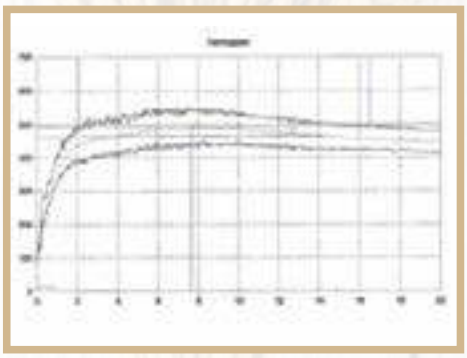


22

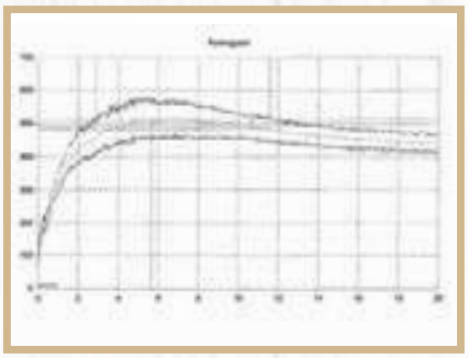


## FARINOGRAM

20

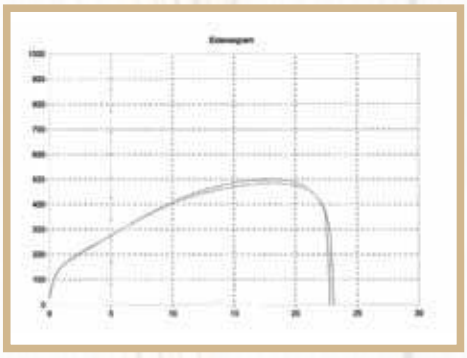


22

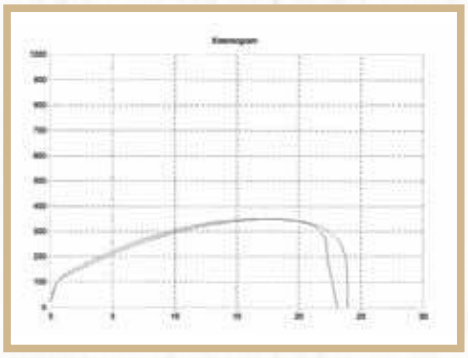


## EXTENSOGRAM

20

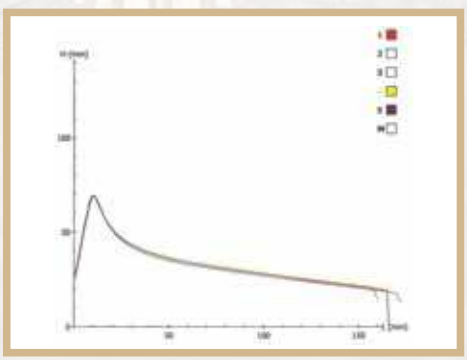


22

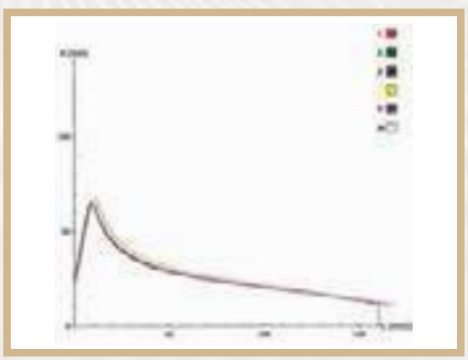


## ALVEOGRAM

20



22



# South African Quality data per production region
## SUMMER RAINFALL AND IRRIGATION WHEAT

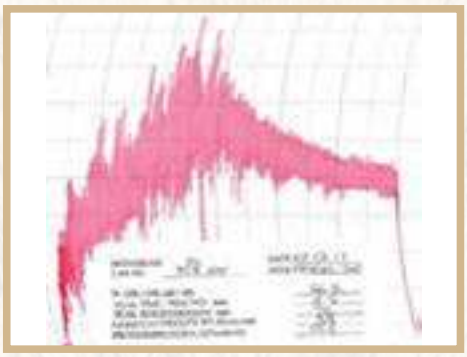
| PRODUCTION REGION | (23) Free State North-Western Region (Bultfontein) | | | | (24) Free State Central Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 15.9 | 13.3 | 18.9 | 1.74 | 13.7 | 12.0 | 15.2 | 1.25 |
| Falling number, sec | 309 | 237 | 411 | 58.00 | 347 | 290 | 446 | 55.05 |
| 1000 Kernel mass (13% mb), g | 32.4 | 27.8 | 38.1 | 3.81 | 33.1 | 25.5 | 39.4 | 3.77 |
| Hectolitre mass (dirty), kg/hl | 77.1 | 74.3 | 79.3 | 1.61 | 82.0 | 81.3 | 82.8 | 0.55 |
| Screenings (<1.8 mm sieve), % | 2.19 | 0.72 | 4.69 | 1.35 | 1.83 | 0.76 | 4.40 | 1.14 |
| Total damaged kernels, % | 0.63 | 0.24 | 1.54 | 0.50 | 0.56 | 0.14 | 0.94 | 0.26 |
| Combined deviations, % | 3.38 | 1.30 | 5.33 | 1.57 | 2.63 | 1.65 | 5.30 | 1.17 |
| ***Number of samples*** | ***9*** | | | | ***8*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | PAN 3161 24.1<br>PAN 3120 23.8<br>PAN 3118 14.0<br>SST 387 9.8<br>MATLABAS 7.4 | | | | PAN 3471 18.9<br>SST 875 17.4<br>PAN 3120 16.4<br>PAN 3400 8.6<br>SST 884 8.3 | | | |
| ***Number of samples*** | ***9*** | | | | ***8*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 2.8 | 2.0 | 3.6 | 0.54 | 2.7 | 2.2 | 3.0 | 0.25 |
| Tail height (6 min), mm | 53 | 50 | 55 | 1.66 | 49 | 44 | 52 | 2.62 |
| ***Number of samples*** | ***9*** | | | | ***8*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 70.4 | 67.2 | 68.4 | 69.9 | 70.2 | - | 71.9 | - | - | - | 72.3 | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 15.1 | 16.9 | 17.0 | 12.5 | 13.8 | - | 11.3 | - | - | - | 12.6 | - |
| Ash (db), % | 0.58 | 0.64 | 0.65 | 0.60 | 0.60 | - | 0.61 | - | - | - | 0.61 | - |
| Colour, KJ (wet) | -3.2 | -2.5 | -2.0 | -3.2 | -3.2 | - | -3.9 | - | - | - | -3.5 | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 92.81 | 92.28 | 92.17 | 93.10 | 93.23 | - | 93.74 | - | - | - | 93.38 | - |
| a* | 0.52 | 0.51 | 0.48 | 0.48 | 0.49 | - | 0.47 | - | - | - | 0.55 | - |
| b* | 10.58 | 10.90 | 9.94 | 10.45 | 10.42 | - | 9.96 | - | - | - | 10.09 | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 1769 | 1513 | 1280 | 2585 | 2477 | - | 2197 | - | - | - | 2457 | - |
| Minimum viscosity (Through), cP | 1506 | 1213 | 1113 | 2105 | 1884 | - | 1711 | - | - | - | 1899 | - |
| Final Viscosity, cP | 1964 | 1585 | 1407 | 2671 | 2767 | - | 2433 | - | - | - | 2639 | - |
| Peak Time, min | 7.00 | 7.00 | 6.60 | 7.00 | 7.00 | - | 7.00 | - | - | - | 7.00 | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 42.1 | 51.1 | 49.5 | 33.6 | 37.0 | - | 32.1 | - | - | - | 34.8 | - |
| Dry gluten (14% mb), % | 15.4 | 17.4 | 16.6 | 11.7 | 12.8 | - | 11.1 | - | - | - | 11.8 | - |
| Gluten Index | 88 | 63 | 76 | 96 | 94 | - | 94 | - | - | - | 97 | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 64.6 | 67.9 | 68.5 | 60.1 | 61.2 | - | 60.4 | - | - | - | 59.5 | - |
| Development time, min | 8.0 | 9.0 | 8.5 | 6.8 | 6.3 | - | 5.0 | - | - | - | 5.7 | - |
| Stability, min | 11.0 | 15.9 | 15.3 | 15.9 | 11.8 | - | 5.8 | - | - | - | 9.3 | - |
| Mixing tolerance index, BU | 28 | 24 | 15 | 16 | 22 | - | 51 | - | - | - | 30 | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 106 | 90 | 110 | 137 | 118 | - | 86 | - | - | - | 135 | - |
| Maximum height, BU | 329 | 295 | 322 | 524 | 384 | - | 313 | - | - | - | 468 | - |
| Extensibility, mm | 229 | 220 | 250 | 191 | 225 | - | 194 | - | - | - | 211 | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 57.4 | 51.5 | 56.4 | 45.9 | 40.4 | - | 33.2 | - | - | - | 44.7 | - |
| Stability (P), mm | 88 | 94 | 107 | 88 | 78 | - | 69 | - | - | - | 74 | - |
| Distensibility (L), mm | 173 | 132 | 109 | 117 | 116 | - | 132 | - | - | - | 148 | - |
| Configuration ratio (P/L) | 0.51 | 0.71 | 0.98 | 0.75 | 0.67 | - | 0.52 | - | - | - | 0.50 | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.4 | 2.0 | 2.4 | 3.2 | 2.8 | - | 2.3 | - | - | - | 2.7 | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1206 | 1221 | 1189 | 1108 | 1185 | - | 1079 | - | - | - | 1185 | - |
| Evaluation (see page 72) | 0 | 0 | 2 | 0 | 0 | - | 0 | - | - | - | 0 | - |

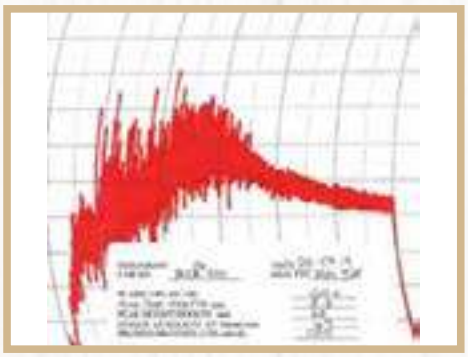
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

23

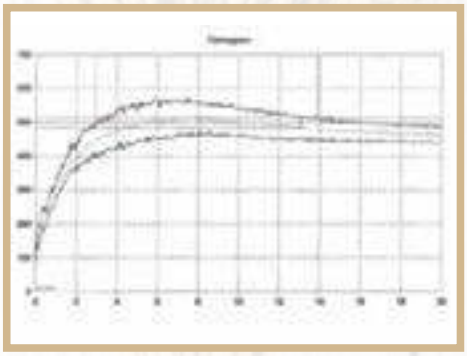


24

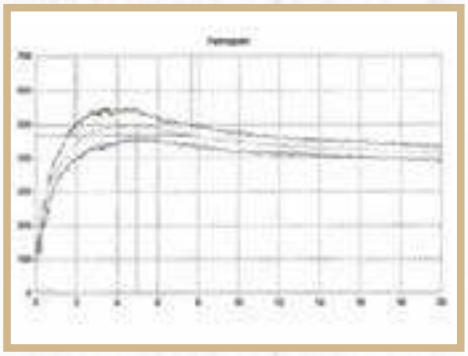


## FARINOGRAM

23

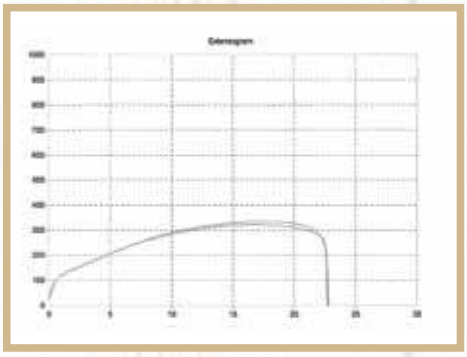


24

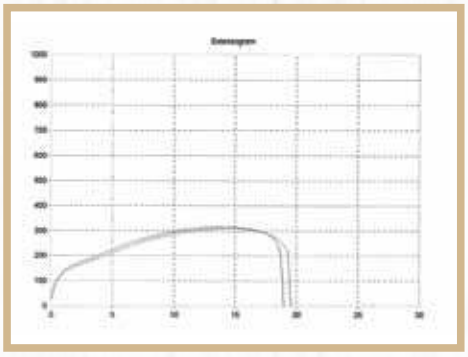


## EXTENSOGRAM

23

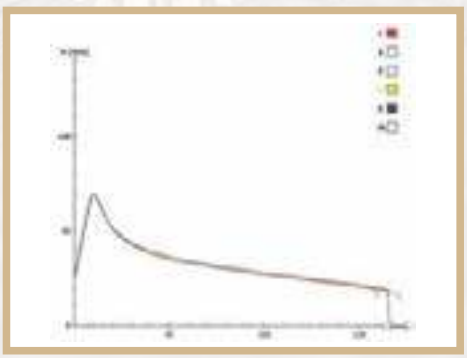


24

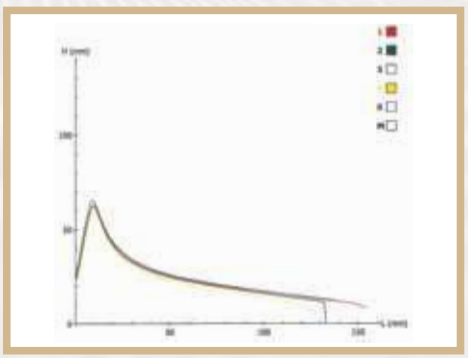


## ALVEOGRAM

23



24



# South African Quality data per production region
## SUMMER RAINFALL AND IRRIGATION WHEAT

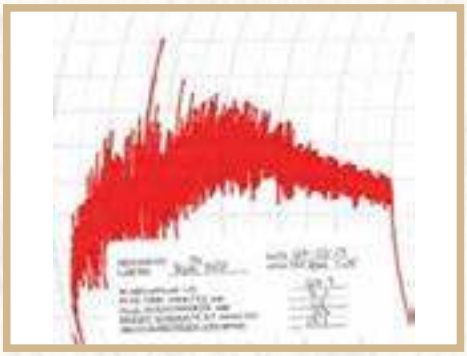
| PRODUCTION REGION | (25) Free State South-Western Region | | | | | | (28) Free State Eastern Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | | | | | | | | | | | | |
| | **ave** | | **min** | **max** | **stdev** | | **ave** | | **min** | **max** | **stdev** | |
| Protein (12% mb), % | 14.0 | | 13.0 | 14.8 | 0.66 | | 13.0 | | 10.7 | 14.3 | 0.92 | |
| Falling number, sec | 293 | | 128 | 379 | 76.94 | | 327 | | 256 | 367 | 41.28 | |
| 1000 Kernel mass (13% mb), g | 37.5 | | 31.0 | 40.7 | 3.13 | | 37.3 | | 31.5 | 42.4 | 3.07 | |
| Hectolitre mass (dirty), kg/hl | 78.9 | | 74.5 | 82.0 | 2.50 | | 80.1 | | 75.9 | 83.6 | 2.68 | |
| Screenings (<1.8 mm sieve), % | 1.05 | | 0.07 | 2.15 | 0.69 | | 0.69 | | 0.19 | 1.84 | 0.50 | |
| Total damaged kernels, % | 1.28 | | 0.42 | 4.62 | 1.28 | | 0.83 | | 0.22 | 1.84 | 0.52 | |
| Combined deviations, % | 2.81 | | 1.47 | 5.38 | 1.14 | | 2.18 | | 0.72 | 4.38 | 1.09 | |
| ***Number of samples*** | ***11*** | | | | | | ***10*** | | | | | |
| **CULTIVARS** | | | | | | | | | | | | |
| | ELANDS | 26.8 | | | | | SST 875 | 24.8 | | | | |
| cultivars | PAN 3161 | 25.0 | | | | | PAN 3471 | 13.2 | | | | |
| with highest % | SST 356 | 23.4 | | | | | SST 356 | 12.9 | | | | |
| occurrence | MATLABAS | 21.1 | | | | | ELANDS | 10.3 | | | | |
| | PAN 3471 | 3.1 | | | | | SST 884 | 9.9 | | | | |
| ***Number of samples*** | ***11*** | | | | | | ***10*** | | | | | |
| **MIXOGRAM (Quadromat Junior)** | | | | | | | | | | | | |
| | **ave** | | **min** | **max** | **stdev** | | **ave** | | **min** | **max** | **stdev** | |
| Peak time, min | 3.3 | | 3.0 | 3.7 | 0.25 | | 3.4 | | 2.6 | 4.0 | 0.45 | |
| Tail height (6 min), mm | 54 | | 50 | 62 | 3.98 | | 52 | | 49 | 58 | 2.69 | |
| ***Number of samples*** | ***11*** | | | | | | ***10*** | | | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 71.4 | - | 70.1 | - | - | - | 73.8 | - | 72.3 | - | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 13.0 | - | 12.9 | - | - | - | 12.4 | - | 10.5 | - | - | - |
| Ash (db), % | 0.56 | - | 0.55 | - | - | - | 0.55 | - | 0.52 | - | - | - |
| Colour, KJ (wet) | -3.3 | - | -2.6 | - | - | - | -3.3 | - | -3.1 | - | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.44 | - | 93.06 | - | - | - | 93.40 | - | 93.52 | - | - | - |
| a* | 0.43 | - | 0.34 | - | - | - | 0.44 | - | 0.34 | - | - | - |
| b* | 10.11 | - | 10.59 | - | - | - | 9.62 | - | 10.53 | - | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2000 | - | 1650 | - | - | - | 2224 | - | 1903 | - | - | - |
| Minimum viscosity (Through), cP | 1796 | - | 1454 | - | - | - | 1744 | - | 1569 | - | - | - |
| Final Viscosity, cP | 2234 | - | 1845 | - | - | - | 2434 | - | 2152 | - | - | - |
| Peak Time, min | 6.33 | - | 6.87 | - | - | - | 7.00 | - | 7.00 | - | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 35.3 | - | 34.4 | - | - | - | 33.4 | - | 27.4 | - | - | - |
| Dry gluten (14% mb), % | 12.6 | - | 11.6 | - | - | - | 12.0 | - | 9.7 | - | - | - |
| Gluten Index | 95 | - | 97 | - | - | - | 98 | - | 99 | - | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 63.2 | - | 61.9 | - | - | - | 61.1 | - | 58.6 | - | - | - |
| Development time, min | 7.9 | - | 7.5 | - | - | - | 7.3 | - | 6.2 | - | - | - |
| Stability, min | 12.7 | - | 12.5 | - | - | - | 11.1 | - | 10.3 | - | - | - |
| Mixing tolerance index, BU | 24 | - | 22 | - | - | - | 28 | - | 27 | - | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 123 | - | 108 | - | - | - | 137 | - | 88 | - | - | - |
| Maximum height, BU | 431 | - | 379 | - | - | - | 441 | - | 361 | - | - | - |
| Extensibility, mm | 210 | - | 206 | - | - | - | 227 | - | 175 | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 57.8 | - | 45.3 | - | - | - | 47.6 | - | 34.3 | - | - | - |
| Stability (P), mm | 102 | - | 86 | - | - | - | 78 | - | 78 | - | - | - |
| Distensibility (L), mm | 124 | - | 115 | - | - | - | 148 | - | 94 | - | - | - |
| Configuration ratio (P/L) | 0.82 | - | 0.75 | - | - | - | 0.53 | - | 0.83 | - | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.9 | - | 3.0 | - | - | - | 2.8 | - | 3.0 | - | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1087 | - | 1129 | - | - | - | 1123 | - | 967 | - | - | - |
| Evaluation (see page 72) | 0 | - | 0 | - | - | - | 0 | - | 0 | - | - | - |

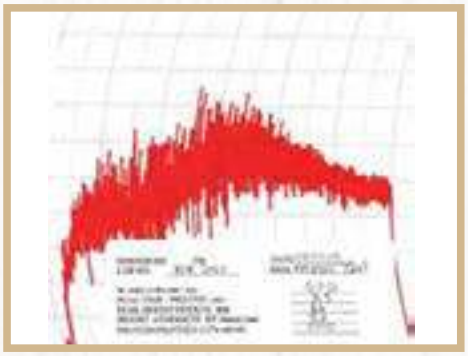
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

25

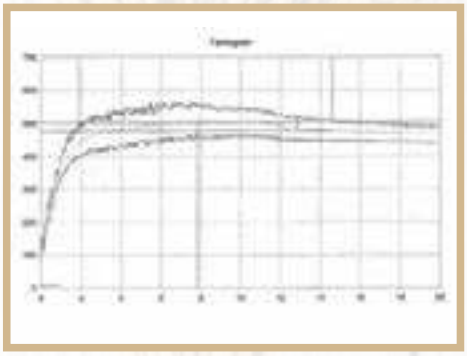


28

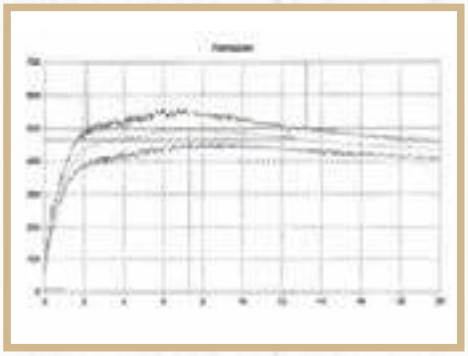


## FARINOGRAM

25

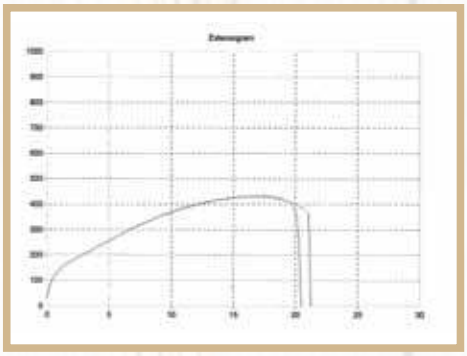


28

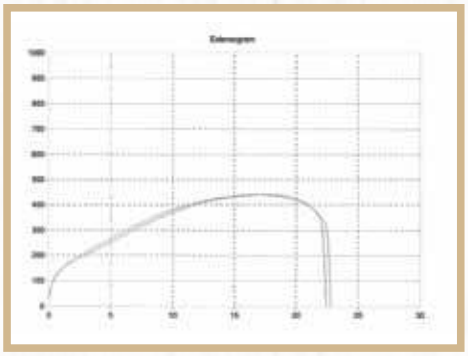


## EXTENSOGRAM

25

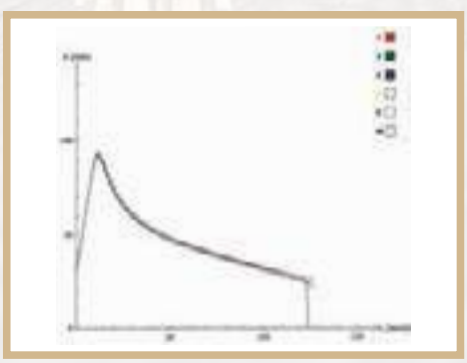


28

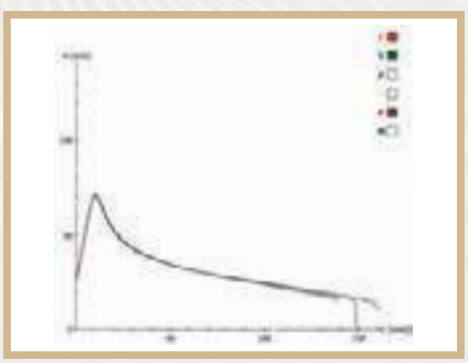


## ALVEOGRAM

25



28



# South African Quality data per production region
## IRRIGATION WHEAT

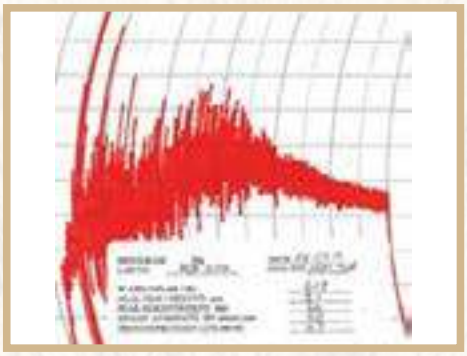
| PRODUCTION REGION | (29) Mpumalanga Southern Region | | | | (32) Mpumalanga Western Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 12.7 | - | - | - | 13.5 | 12.7 | 14.5 | 0.91 |
| Falling number, sec | 291 | - | - | - | 372 | 286 | 487 | 103.73 |
| 1000 Kernel mass (13% mb), g | 36.5 | - | - | - | 37.6 | 28.1 | 44.7 | 8.56 |
| Hectolitre mass (dirty), kg/hl | 80.8 | - | - | - | 81.2 | 80.0 | 81.9 | 1.02 |
| Screenings (<1.8 mm sieve), % | 2.43 | - | - | - | 3.32 | 0.03 | 9.32 | 5.20 |
| Total damaged kernels, % | 0.82 | - | - | - | 0.52 | 0.28 | 0.72 | 0.22 |
| Combined deviations, % | 4.03 | - | - | - | 4.55 | 1.21 | 10.34 | 5.03 |
| ***Number of samples*** | ***1*** | | | | ***3*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | SST 875 | 58.0 | | | SST 875 | 52.0 | | |
| | SST 884 | 33.0 | | | SST 835 | 20.3 | | |
| | SST 835 | 9.0 | | | SABIE | 9.7 | | |
| | | | | | PAN 3471 | 8.7 | | |
| | | | | | SST 884 | 6.7 | | |
| ***Number of samples*** | ***1*** | | | | ***3*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 3.1 | - | - | - | 3.1 | 2.9 | 3.3 | 0.21 |
| Tail height (6 min), mm | 50 | - | - | - | 51 | 51 | 51 | 0.00 |
| ***Number of samples*** | ***1*** | | | | ***3*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 72.8 | - | - | - | - | - | 76.3 | - | - | - | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.4 | - | - | - | - | - | 12.1 | - | - | - | - | - |
| Ash (db), % | 0.60 | - | - | - | - | - | 0.55 | - | - | - | - | - |
| Colour, KJ (wet) | -3.0 | - | - | - | - | - | -3.6 | - | - | - | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.63 | - | - | - | - | - | 93.64 | - | - | - | - | - |
| a* | 0.41 | - | - | - | - | - | 0.43 | - | - | - | - | - |
| b* | 9.06 | - | - | - | - | - | 9.51 | - | - | - | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 1997 | - | - | - | - | - | 2471 | - | - | - | - | - |
| Minimum viscosity (Through), cP | 1706 | - | - | - | - | - | 2034 | - | - | - | - | - |
| Final Viscosity, cP | 2103 | - | - | - | - | - | 2699 | - | - | - | - | - |
| Peak Time, min | 6.87 | - | - | - | - | - | 7.00 | - | - | - | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 31.4 | - | - | - | - | - | 32.1 | - | - | - | - | - |
| Dry gluten (14% mb), % | 10.4 | - | - | - | - | - | 11.4 | - | - | - | - | - |
| Gluten Index | 95 | - | - | - | - | - | 97 | - | - | - | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 58.9 | - | - | - | - | - | 59.8 | - | - | - | - | - |
| Development time, min | 6.0 | - | - | - | - | - | 7.4 | - | - | - | - | - |
| Stability, min | 8.2 | - | - | - | - | - | 9.3 | - | - | - | - | - |
| Mixing tolerance index, BU | 45 | - | - | - | - | - | 40 | - | - | - | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | - | - | - | - | - | - | 128 | - | - | - | - | - |
| Maximum height, BU | - | - | - | - | - | - | 417 | - | - | - | - | - |
| Extensibility, mm | - | - | - | - | - | - | 225 | - | - | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 35.2 | - | - | - | - | - | 42.7 | - | - | - | - | - |
| Stability (P), mm | 64 | - | - | - | - | - | 67 | - | - | - | - | - |
| Distensibility (L), mm | 143 | - | - | - | - | - | 168 | - | - | - | - | - |
| Configuration ratio (P/L) | 0.45 | - | - | - | - | - | 0.40 | - | - | - | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.8 | - | - | - | - | - | 2.8 | - | - | - | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1045 | - | - | - | - | - | 1130 | - | - | - | - | - |
| Evaluation (see page 72) | 0 | - | - | - | - | - | 0 | - | - | - | - | - |

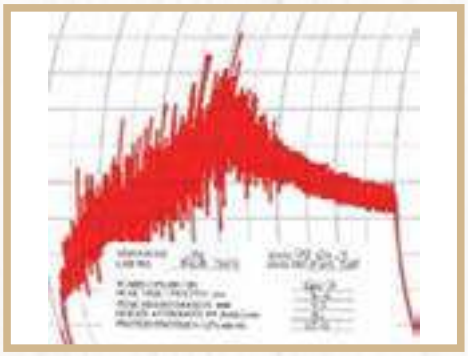
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

29

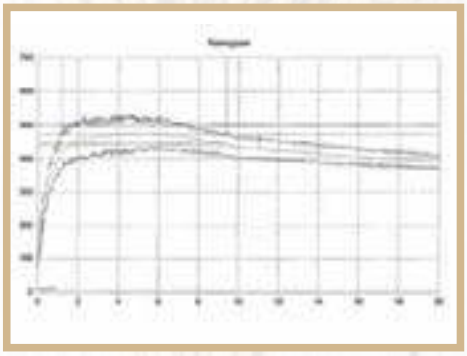


32

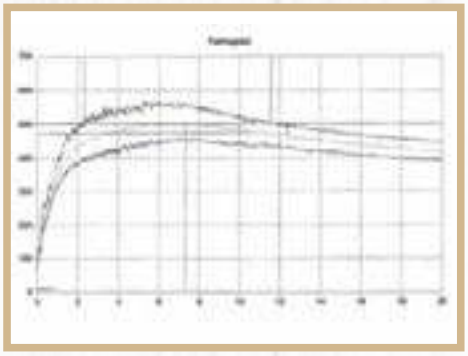


## FARINOGRAM

29



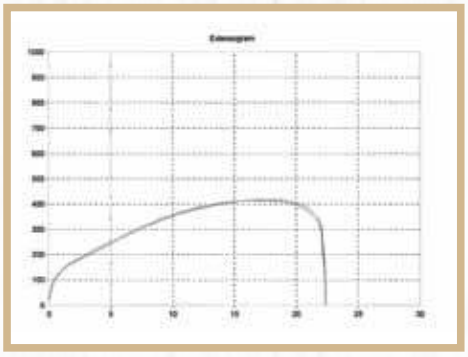
32



## EXTENSOGRAM

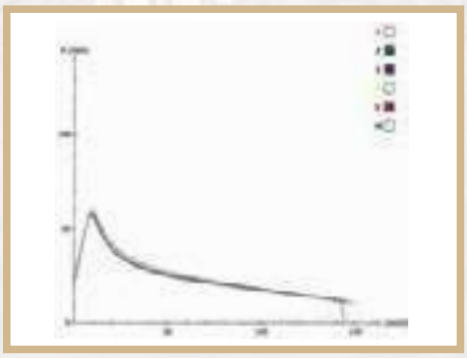
29

32

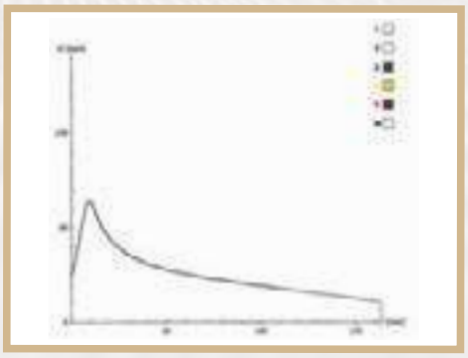


## ALVEOGRAM

29



32



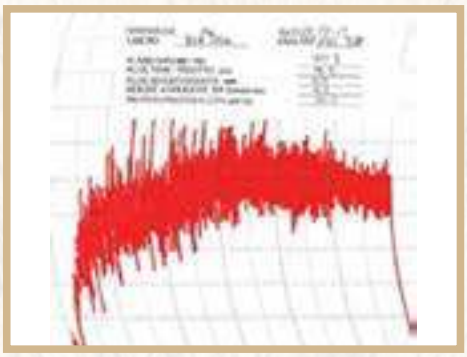
# South African Quality data per production region
## IRRIGATION WHEAT

| PRODUCTION REGION | (33) Mpumalanga Northern Region | | | | | | (34) Gauteng Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Protein (12% mb), % | 12.2 | 10.6 | 13.5 | 0.83 | | | 13.2 | 12.6 | 13.9 | 0.64 | | |
| Falling number, sec | 399 | 333 | 629 | 75.13 | | | 319 | 251 | 401 | 75.97 | | |
| 1000 Kernel mass (13% mb), g | 37.7 | 30.8 | 43.0 | 4.07 | | | 35.9 | 29.4 | 40.7 | 5.82 | | |
| Hectolitre mass (dirty), kg/hl | 81.6 | 80.3 | 84.1 | 1.24 | | | 81.2 | 79.7 | 82.0 | 1.30 | | |
| Screenings (<1.8 mm sieve), % | 1.04 | 0.33 | 2.96 | 0.80 | | | 1.57 | 0.49 | 3.52 | 1.69 | | |
| Total damaged kernels, % | 0.80 | 0.10 | 2.56 | 0.64 | | | 1.30 | 0.24 | 2.52 | 1.15 | | |
| Combined deviations, % | 2.25 | 1.27 | 4.62 | 1.00 | | | 3.38 | 2.48 | 4.08 | 0.82 | | |
| ***Number of samples*** | ***13*** | | | | | | ***3*** | | | | | |
| **CULTIVARS** | | | | | | | | | | | | |
| | SST 884 | 33.7 | | | | | SST 875 | 62.0 | | | | |
| cultivars | SST 875 | 26.9 | | | | | SST 843 | 17.3 | | | | |
| with highest % | DUZI | 12.8 | | | | | SST 884 | 12.3 | | | | |
| occurrence | SST 835 | 10.6 | | | | | SST 835 | 5.0 | | | | |
| | SST 876 | 9.6 | | | | | SST 876 | 3.3 | | | | |
| ***Number of samples*** | ***13*** | | | | | | ***3*** | | | | | |
| **MIXOGRAM (Quadromat Junior)** | | | | | | | | | | | | |
| | **ave** | **min** | **max** | **stdev** | | | **ave** | **min** | **max** | **stdev** | | |
| Peak time, min | 3.7 | 2.6 | 5.0 | 0.68 | | | 3.5 | 2.8 | 4.7 | 1.07 | | |
| Tail height (6 min), mm | 51 | 45 | 57 | 3.46 | | | 52 | 48 | 58 | 5.29 | | |
| ***Number of samples*** | ***13*** | | | | | | ***3*** | | | | | |
| | **COMPOSITE SAMPLES** | | | | | | | | | | | |
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 74.4 | 74.6 | - | - | - | - | 73.9 | - | - | - | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.5 | 10.4 | - | - | - | - | 13.0 | - | - | - | - | - |
| Ash (db), % | 0.57 | 0.57 | - | - | - | - | 0.57 | - | - | - | - | - |
| Colour, KJ (wet) | -3.5 | -3.3 | - | - | - | - | -3.1 | - | - | - | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.40 | 93.22 | - | - | - | - | 93.38 | - | - | - | - | - |
| a* | 0.53 | 0.63 | - | - | - | - | 0.36 | - | - | - | - | - |
| b* | 10.16 | 10.30 | - | - | - | - | 9.03 | - | - | - | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2550 | 2541 | - | - | - | - | 1762 | - | - | - | - | - |
| Minimum viscosity (Through), cP | 2003 | 2044 | - | - | - | - | 1540 | - | - | - | - | - |
| Final Viscosity, cP | 2866 | 2805 | - | - | - | - | 1891 | - | - | - | - | - |
| Peak Time, min | 7.00 | 7.00 | - | - | - | - | 6.67 | - | - | - | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 30.0 | 26.6 | - | - | - | - | 35.0 | - | - | - | - | - |
| Dry gluten (14% mb), % | 10.7 | 9.5 | - | - | - | - | 12.3 | - | - | - | - | - |
| Gluten Index | 98 | 97 | - | - | - | - | 98 | - | - | - | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 58.4 | 57.0 | - | - | - | - | 60.6 | - | - | - | - | - |
| Development time, min | 6.3 | 6.6 | - | - | - | - | 6.7 | - | - | - | - | - |
| Stability, min | 10.8 | 12.1 | - | - | - | - | 9.0 | - | - | - | - | - |
| Mixing tolerance index, BU | 27 | 23 | - | - | - | - | 41 | - | - | - | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 119 | 104 | - | - | - | - | 143 | - | - | - | - | - |
| Maximum height, BU | 425 | 473 | - | - | - | - | 409 | - | - | - | - | - |
| Extensibility, mm | 203 | 159 | - | - | - | - | 251 | - | - | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 42.5 | 39.4 | - | - | - | - | 44.5 | - | - | - | - | - |
| Stability (P), mm | 68 | 76 | - | - | - | - | 62 | - | - | - | - | - |
| Distensibility (L), mm | 164 | 121 | - | - | - | - | 210 | - | - | - | - | - |
| Configuration ratio (P/L) | 0.41 | 0.63 | - | - | - | - | 0.30 | - | - | - | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 2.9 | 3.5 | - | - | - | - | 2.7 | - | - | - | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1078 | 1028 | - | - | - | - | 1226 | - | - | - | - | - |
| Evaluation (see page 72) | 0 | 0 | - | - | - | - | 0 | - | - | - | - | - |

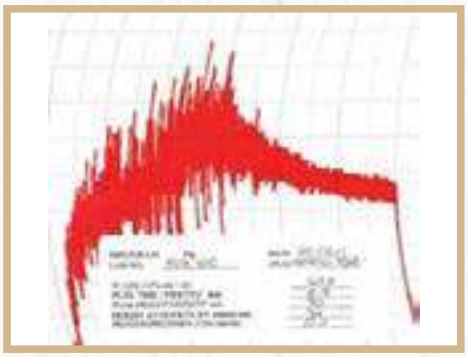
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

33

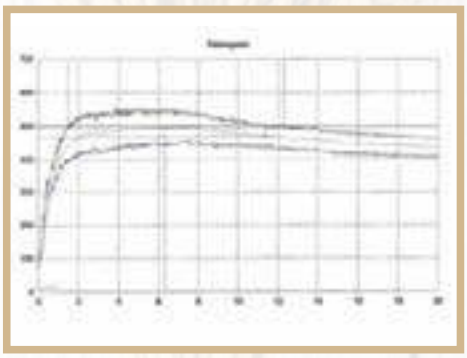


34

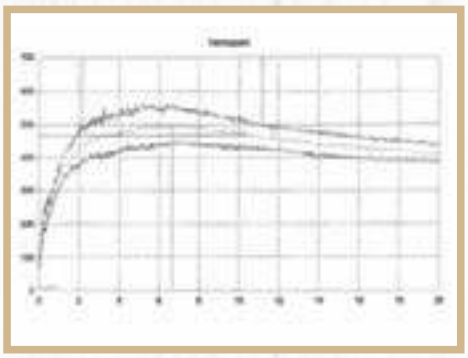


## FARINOGRAM

33

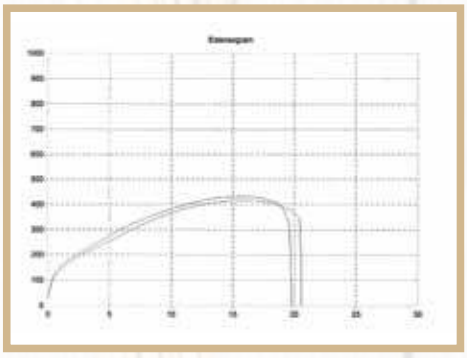


34

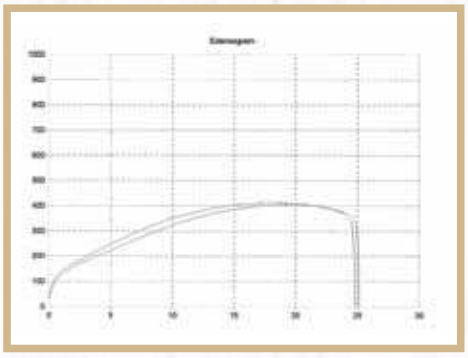


## EXTENSOGRAM

33

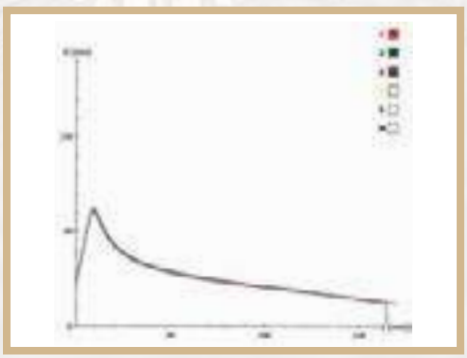


34

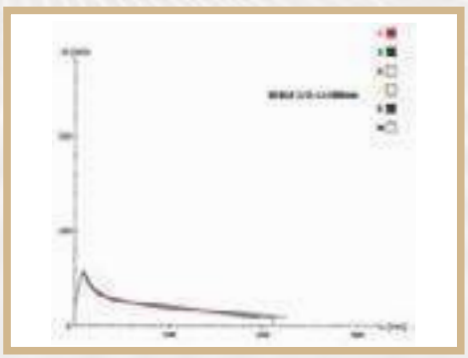


## ALVEOGRAM

33



34



# South African Quality data per production region
## IRRIGATION WHEAT

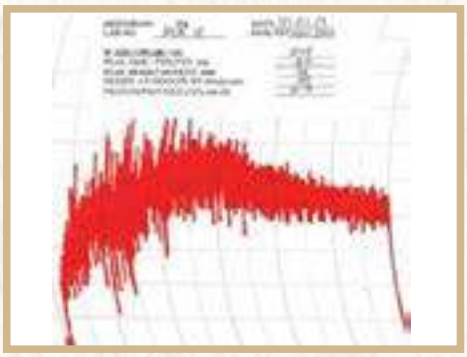
| PRODUCTION REGION | (35) Limpopo Region | | | | (36) KwaZulu-Natal Region | | | |
|---|---|---|---|---|---|---|---|---|
| ***WHEAT*** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Protein (12% mb), % | 11.7 | 10.6 | 13.0 | 0.81 | 13.2 | 12.4 | 13.6 | 0.69 |
| Falling number, sec | 354 | 297 | 428 | 44.92 | 379 | 344 | 401 | 30.44 |
| 1000 Kernel mass (13% mb), g | 39.1 | 32.6 | 44.1 | 2.88 | 39.6 | 39.0 | 40.6 | 0.87 |
| Hectolitre mass (dirty), kg/hl | 82.2 | 80.7 | 84.7 | 1.00 | 81.8 | 81.6 | 82.0 | 0.20 |
| Screenings (<1.8 mm sieve), % | 1.55 | 0.44 | 2.91 | 0.92 | 1.07 | 0.99 | 1.15 | 0.08 |
| Total damaged kernels, % | 0.33 | 0.08 | 0.88 | 0.22 | 0.26 | 0.24 | 0.30 | 0.03 |
| Combined deviations, % | 2.35 | 1.00 | 4.22 | 1.09 | 1.72 | 1.31 | 2.13 | 0.41 |
| ***Number of samples*** | ***11*** | | | | ***3*** | | | |
| **CULTIVARS** | | | | | | | | |
| cultivars with highest % occurrence | DUZI 30.9<br>SST 884 23.4<br>SST 875 21.3<br>SST 843 9.0<br>SST 876 7.7 | | | | SST 843 34.7<br>SST 835 30.0<br>SST 806 12.7<br>SST 884 10.0<br>PAN 3471 8.3 | | | |
| ***Number of samples*** | ***11*** | | | | ***3*** | | | |
| **MIXOGRAM (Quadromat Junior)** | **ave** | **min** | **max** | **stdev** | **ave** | **min** | **max** | **stdev** |
| Peak time, min | 3.0 | 2.3 | 3.8 | 0.57 | 3.1 | 2.3 | 3.8 | 0.75 |
| Tail height (6 min), mm | 47 | 42 | 53 | 4.04 | 52 | 42 | 58 | 8.96 |
| ***Number of samples*** | ***11*** | | | | ***3*** | | | |

| | COMPOSITE SAMPLES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS AND GRADE** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** |
| BÜHLER EXTRACTION, % | 74.3 | 74.4 | 73.2 | - | - | - | 72.8 | - | - | - | - | - |
| ***FLOUR*** | | | | | | | | | | | | |
| Protein (12% mb), % | 11.5 | 10.7 | 9.8 | - | - | - | 12.0 | - | - | - | - | - |
| Ash (db), % | 0.58 | 0.61 | 0.56 | - | - | - | 0.58 | - | - | - | - | - |
| Colour, KJ (wet) | -3.5 | -3.5 | -3.9 | - | - | - | -3.6 | - | - | - | - | - |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | |
| L* | 93.33 | 93.35 | 93.81 | - | - | - | 93.68 | - | - | - | - | - |
| a* | 0.49 | 0.43 | 0.40 | - | - | - | 0.42 | - | - | - | - | - |
| b* | 9.99 | 10.31 | 9.71 | - | - | - | 9.20 | - | - | - | - | - |
| **RVA** | | | | | | | | | | | | |
| Peak Viscosity, cP | 2438 | 2427 | 2335 | - | - | - | 2276 | - | - | - | - | - |
| Minimum viscosity (Through), cP | 1895 | 2018 | 1818 | - | - | - | 1655 | - | - | - | - | - |
| Final Viscosity, cP | 2735 | 2752 | 2651 | - | - | - | 2556 | - | - | - | - | - |
| Peak Time, min | 7.00 | 7.00 | 7.00 | - | - | - | 7.00 | - | - | - | - | - |
| **GLUTEN** | | | | | | | | | | | | |
| Wet gluten (14% mb), % | 29.4 | 28.3 | 26.5 | - | - | - | 32.6 | - | - | - | - | - |
| Dry gluten (14% mb), % | 10.3 | 9.7 | 8.6 | - | - | - | 11.2 | - | - | - | - | - |
| Gluten Index | 98 | 95 | 97 | - | - | - | 95 | - | - | - | - | - |
| **FARINOGRAM** | | | | | | | | | | | | |
| Water absorption (14% mb), % | 59.8 | 58.0 | 58.9 | - | - | - | 61.0 | - | - | - | - | - |
| Development time, min | 6.6 | 5.3 | 5.4 | - | - | - | 7.0 | - | - | - | - | - |
| Stability, min | 10.7 | 9.0 | 8.5 | - | - | - | 9.1 | - | - | - | - | - |
| Mixing tolerance index, BU | 28 | 33 | 35 | - | - | - | 38 | - | - | - | - | - |
| **EXTENSOGRAM (45 min pull)** | | | | | | | | | | | | |
| Area, $cm^2$ | 113 | 92 | 100 | - | - | - | 126 | - | - | - | - | - |
| Maximum height, BU | 409 | 362 | 409 | - | - | - | 455 | - | - | - | - | - |
| Extensibility, mm | 203 | 185 | 178 | - | - | - | 205 | - | - | - | - | - |
| **ALVEOGRAM** | | | | | | | | | | | | |
| Strength (S), $cm^2$ | 41.8 | 34.4 | 36.1 | - | - | - | 43.9 | - | - | - | - | - |
| Stability (P), mm | 72 | 57 | 74 | - | - | - | 77 | - | - | - | - | - |
| Distensibility (L), mm | 148 | 165 | 131 | - | - | - | 150 | - | - | - | - | - |
| Configuration ratio (P/L) | 0.49 | 0.35 | 0.56 | - | - | - | 0.51 | - | - | - | - | - |
| **MIXOGRAM** | | | | | | | | | | | | |
| Peak time, min | 3.2 | 3.0 | 3.1 | - | - | - | 3.0 | - | - | - | - | - |
| **100g BAKING TEST** | | | | | | | | | | | | |
| Loaf volume, $cm^3$ | 1049 | 1092 | 959 | - | - | - | 1082 | - | - | - | - | - |
| Evaluation (see page 72) | 0 | 0 | 0 | - | - | - | 0 | - | - | - | - | - |

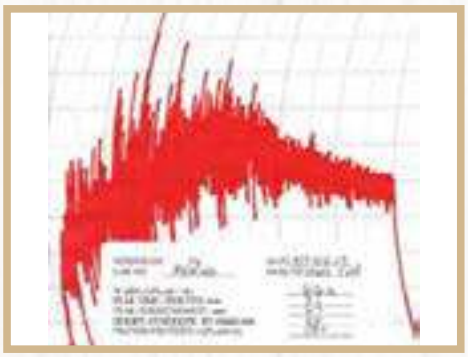
# RHEOLOGICAL GRAPHS PER PRODUCTION REGION

## MIXOGRAM

35

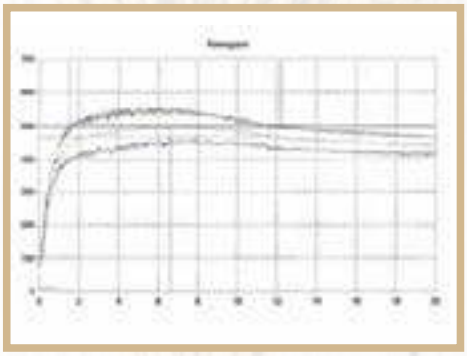


36



## FARINOGRAM

35



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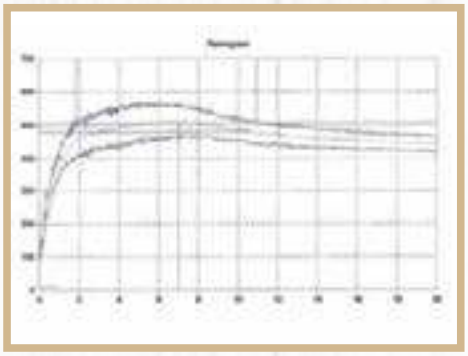
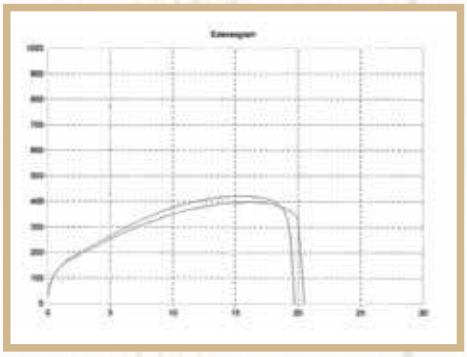
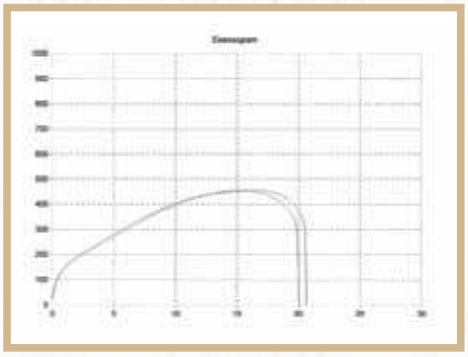


## EXTENSOGRAM

35

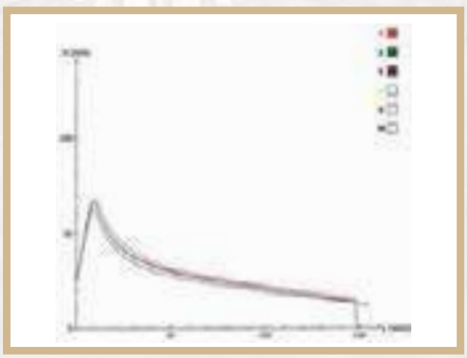


36

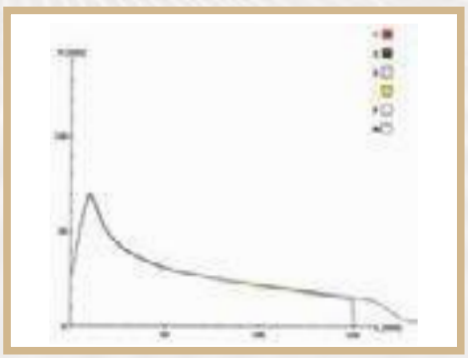


## ALVEOGRAM

35



36



# Mycotoxins

Global trends in the occurrence and concentration levels of mycotoxins are summarised in the Annual BIOMIN Mycotoxin Survey report of 2016. A total number of 16 511 agricultural commodity samples from 81 countries were analysed, which represented more than 63 000 analyses. These samples included maize, wheat, barley, rice, soybean meal, corn gluten meal, dried distiller's grains and silage amongst others. Summaries of the regulated mycotoxins, aflatoxin (Afla), fumonisins (FUM), deoxynivalenol (DON), ochratoxin A (OTA), zearalenone (ZON) and T-2 toxin for Europe, Asia, Middle East, North America, South & Central America and Africa are included in this report. Multiple mycotoxin occurrence was re-confirmed.

The sixth monthly mycotoxin trends from January to December 2016 confirmed the influence of climatic change patterns on the mycotoxin occurrence and levels. Early 2016 results compared to the second half of 2016 results, showed risk levels (percentage of samples at a level above the risk threshold) increasing worldwide (South Africa from 45% to 73%). A total of 263 samples from Africa that included finished feed, maize and cereal (wheat and sorghum) were tested. Of the 24 cereal samples tested, 17% was contaminated with Afla (2 ppb / 2 ppb), 67% with ZON (47 ppb / 195 ppb), 79% with DON (589 ppb / 2 724 ppb), 12% with T-2 (26 ppb / 68 ppb), 21% with FUM (306 ppb / 1 340 ppb) and 50% with OTA (7 ppb / 27 ppb). The average of the positives and the maximum value in ppb are provided in the brackets.[1]

Constant monitoring and continued research on the prevention and mitigation of mycotoxin contamination are necessary. Application of good agricultural practices and storage conditions as well as effective mycotoxin risk management programs are essential elements in preventing the negative effects of mycotoxins.

## National Mycotoxin Regulations

According to the Foodstuffs, Cosmetics and Disinfectants Act (Act 54 of 1972) and regulations published under Government Notice No. R. 1145, dated 8 October 2004, all foodstuffs, ready for human consumption, may not contain more than 10 µg/kg of aflatoxin, of which aflatoxin $B_1$ may not exceed 5 µg/kg.

Amendments to Government Notice No. R. 1145, dated 8 October 2004, recently published under Government Notice No. 987 of 05 September 2016, specify that

- Cereal grains (wheat, maize and barley) intended for further processing, may not contain more than 2 000 µg/kg of Deoxinyvalenol.
- Flour, meal, semolina and flakes derived from wheat, maize or barley, ready for human consumption, may not contain more than 1 000 µg/kg of Deoxinyvalenol.

Further processing means any other treatment or processing method that has been proven to reduce levels of fungus produced toxins in foodstuffs intended for human consumption.

## International Mycotoxin Regulations

The Maximum, advisory and guidance levels for mycotoxins on maize, maize products and cereals from the European Union, USA, China and Codex are provided below for comparison purposes.

The European Union specifies the following maximum levels for mycotoxins on cereals and specifically wheat:

### Aflatoxins

- All cereals and all products derived from cereals, including processed cereal products, with the exception of maize, rice, processed cereal-based foods for infants and young children and dietary foods for special medical purposes intended specifically for infants, $B_1 \leq 2.0$ µg/kg.
- All cereals and all products derived from cereals, including processed cereal products, with the exception of maize, rice, processed cereal-based foods for infants and young children and dietary foods for special medical purposes intended specifically for infants, sum of $B_1 + B_2 + G_1 + G_2 \leq 40$ µg/kg.

### Ochratoxin A

- Unprocessed cereals, ≤ 5.0 µg/kg.
- All products derived from unprocessed cereals, including processed cereal products and cereals intended for direct human consumption with certain exceptions (see full regulation), ≤ 3.0 µg/kg.

### Deoxynivalenol

- Unprocessed cereals other than durum wheat, oats and maize, ≤ 1 250 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, with the certain exceptions (see full regulation) ≤ 750 µg/kg.
- Bread (including small bakery wares), pastries, biscuits, cereal snacks and breakfast cereals, ≤ 500 µg/kg.

### Zearalenone

- Unprocessed cereals other than maize ≤ 100 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption and the germ with certain exceptions (see full regulation) ≤ 75 µg/kg.
- Bread (including small bakery wares), pastries, biscuits, cereal snacks and breakfast cereals, excluding maize-snacks and maize-based breakfast cereals, ≤ 50 µg/kg.[2]

### T-2 and HT-2 toxin

- Unprocessed cereal – wheat, rye and other cereal, indicative level 100 µg/kg.
- Cereal grains for direct human consumption – cereals other than oats and maize, indicative level 50 µg/kg.
- Cereal products for human consumption – cereal milling products other than oat and maize, indicative level 50 µg/kg.
- Cereal products for human consumption – breakfast cereals including formed cereal flakes, indicative level 75 µg/kg.
- Cereal products for human consumption – bread (including small bakery wares), pastries, biscuits, cereal snacks, pasta, indicative level 25 µg/kg.
- Cereal products for human consumption – cereal-based foods for infants and young children, indicative level 15 µg/kg.[3]

In the USA, the Food and Drug Administration (FDA) actions levels for Aflatoxin for all commodities intended for human consumption is 20 µg/kg (excluding Aflatoxin $M_1$ in milk where the maximum level is 0.5 µg/kg). Advisory maximum levels for DON in finished wheat products intended for human consumption is 1 000 µg/kg.[4]

In China the maximum level for Aflatoxin $B_1$ in wheat is 5.0 µg/kg. The maximum level for DON in cereals and their products including wheat and wheatmeal is 1 000 µg/kg. Ochratoxin A in cereals and processed products of milled grains may not exceed 5.0 µg/kg and Zearalenone in wheat flour may not exceed 60 µg/kg.[5]

According to Codex, Ochratoxin A in raw wheat may not exceed 5 µg/kg and the proposed maximum level for DON is 2 mg/kg in raw wheat and 1 mg/kg in flour, semolina, meal and flakes derived from wheat.[6]

### References:


1. BIOMIN World Mycotoxin Survey 2016, Annual Report No. 13, www.biomin.net.
2. COMMISSION REGULATION (EC) No 1881/226 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs.
3. COMMISSION RECOMMENDATION of 27 March 2013 on the presence of T-2 and HT-2 toxin in cereals and cereal products.
4. FDA Mycotoxin Regulatory Guidance, A Guide for Grain Elevators, Feed Manufacturers, Grain Processors and Exporters, August 2011.
5. National Food Safety Standard, Maximum Levels of Mycotoxins in Foods, GB 2761-2011.
6. CODEX General Standard for contaminants and toxins in food and feed, CODEX STAN 193-1995, Revised in 1997, 2006, 2008, 2009, Amended 2009.

# Table 6: Mycotoxin results for the 2016/2017 season

| Region | Class and Grade | Aflatoxin (µg/kg) | | | | Fumonisin (µg/kg) | | | Deoxynivalenol (µg/kg) | 15-ADON (µg/kg) | Ochratoxin A (µg/kg) | Zearalenone (µg/kg) | HT-2 Toxin (µg/kg) | T-2 Toxin (µg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $B_1$ | $B_2$ | $G_1$ | $G_2$ | $B_1$ | $B_2$ | $B_3$ | | | | | | |
| | | LOQ | | | | | | | | | | | | |
| | | 5 µg/kg | 5 µg/kg | 5 µg/kg | 5 µg/kg | 20 µg/kg | 20 µg/kg | 20 µg/kg | 100 µg/kg | 100 µg/kg | 5 µg/kg | 20 µg/kg | 20 µg/kg | 20 µg/kg |
| 1 | UT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2 | B4 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | B3 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | UT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | B3 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | B3 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | UT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | B3 | ND | ND | ND | ND | ND | ND | ND | 501 | ND | ND | ND | ND | ND |
| 11 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 12 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 14 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 17 | UT | ND | ND | ND | ND | ND | ND | ND | <100 | ND | ND | ND | ND | ND |
| 19 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 19 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 20 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 20 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 22 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 23 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

# Table 6: Mycotoxin results for the 2016/2017 season (continue)

| Region | Class and Grade | Aflatoxin (µg/kg) | | | | Fumonisin (µg/kg) | | | Deoxynivalenol (µg/kg) | 15-ADON (µg/kg) | Ochratoxin A (µg/kg) | Zearalenone (µg/kg) | HT-2 Toxin (µg/kg) | T-2 Toxin (µg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $B_1$ | $B_2$ | $G_1$ | $G_2$ | $B_1$ | $B_2$ | $B_3$ | | | | | | |
| | | LOQ | | | | | | | | | | | | |
| | | 5 µg/kg | 5 µg/kg | 5 µg/kg | 5 µg/kg | 20 µg/kg | 20 µg/kg | 20 µg/kg | 100 µg/kg | 100 µg/kg | 5 µg/kg | 20 µg/kg | 20 µg/kg | 20 µg/kg |
| 24 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 25 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 28 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 29 | B1 | ND | ND | ND | ND | ND | ND | ND | 242 | ND | ND | ND | ND | ND |
| 32 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 33 | B2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 33 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 34 | B1 | ND | ND | ND | ND | ND | ND | ND | 103 | ND | ND | ND | ND | ND |
| 35 | B2 | ND | ND | ND | ND | ND | ND | ND | 310 | ND | ND | ND | ND | ND |
| 36 | B1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Total number of samples | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Average of total number of samples | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 |
| Number of positive results | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| Average of positive results | | - | - | - | - | - | - | - | 289 | - | - | - | - | - |
| Maximum of positive results | | - | - | - | - | - | - | - | 501 | - | - | - | - | - |

**Note:**

- Limit of quantitation (LOQ) means the lowest concentration level that can be quantified with acceptable presicion and accuracy by the UPLC-MS/MS. A concentration measured below the LOQ is reported as <LOQ.
- Limit of detection (LOD) is the lowest concentration level that can be detected but not quantified and is 50% of the LOQ of each mycotoxin. A concentration measured below the LOD is reported as not detected (ND).
- Mycotoxin levels lower than the LOQ were seen as tested negative for calculation purposes.
- µg/kg = ppb (parts per billion)

# Amino Acid Profile

Amino acids are the building blocks of proteins and approximately 22 amino acids are commonly distributed among the proteins of all biological materials. Of these, 18 can be found in cereal grain proteins. Amino acids are organic compounds containing basic amine (-NH2) and acidic carboxyl (-COOH) functional groups, in addition to a side chain (R group) specific to each amino acid.

Amino acids are considered crucial to good health, contributing considerably to the health of the human nervous system, hormone production as well as muscular structure and are needed by vital organs and for cellular structure. A new study supports the idea that children with a high risk of stunting may not be receiving an adequate dietary intake of essential amino acids.

The classification of amino acids is based on different features, one being whether the amino acid can be acquired through the diet. According to this, three types are identified: essential, conditionally essential and non-essential amino acids. Classification as essential or non-essential, does however not reflect their actual importance, since all of them are necessary for human health. Essential amino acids are considered "essential" as they cannot be synthesized by the body and must be obtained from the diet. The nine amino acids that cannot be synthesized by humas are phenylalanine, valine, threonine, tryptophan, methionine, leucine, isoleucine, lysine and histidine. Arginine, cysteine, glycine, glutamine, proline and tyrosine, are considered conditionally essential in the human diet, meaning their synthesis can be limited under special pathophysiological conditions. Alanine, aspartic acid, asparagine, glutamic acid and serine are non-essential amino acids, meaning they can be synthesized by the body. [1,2]

Whole meal and white flours from different classes and varieties of wheat grown in three different countries (USA, USSR and Australia) show generally similar amino acid compositions, with high contents of glutamic acid (including glutamine) and proline, with very low tryptophan, and relatively low contents of lysine and threonine. Compared with the range of variation in the protein contents of the samples, the variation in their amino acid compositions resulting either from genetic differences or growing conditions such as fertilizer level is rather limited. The reason being that the amino acid compositions of the major endosperm proteins, representing close to 80% of the total wheat proteins, are very similar. Differences in the expression of levels of individual protein genes therefore do not usually result in significant differences in the amino acid compositions of the samples.

Significant variation in amino acid composition may however occur in extreme cases. Research showed that lysine and threonine were for example higher in yellow-berry kernels compared to normal kernels, while glutamic acid (including glutamine) was significantly lower. Extreme differences in fertilization conditions may also result in significant variation in the compositions of whole grain flour or specific protein fractions. It has been found that the proportions of glutamine, proline and phenylalanine in wheat grain and flour all increased with increased levels of nitrogen fertilization, whereas threonine, serine, glycine, alanine, valine and sulphur amino acids decreased.

In a study where wheat was grown under even more extreme fertilization conditions, with variation in nitrogen and sulphur, the grain amino acid composition changed significantly. Less than half of the amounts of cysteine and methionine were present in grain grown with no sulphur and high nitrogen levels compared to grain grown with adequate levels of sulphur.

Proteins are not distributed uniformly throughout a wheat kernel with variation occurring in both the protein content and composition. Even though the starchy endosperm's protein concentration is only a third of that in the germ and less than half of that in the aleurone layer, the starchy endosperm proteins still represent close to three quarters of the total grain protein. The starchy endosperm is characterized by high levels of glutamine and proline and low levels of basic amino acids, while the aleurone and germ contain significantly less proline and glutamine, with high levels of arginine and asparagine in the aleurone layer and germ, respectively. Since the various morphological parts of the wheat kernel differ in protein content and composition, milling extraction rates affect the content and composition of flour.

A large number of flour fractions or mill streams are produced during commercial flour milling which are recombined to provide flours with specific processing characteristics. As a result of the irregular distribution of components within the wheat kernel, these flour streams also vary in their composition and functional properties.

The amino acid compositions of flours differ from those of the grains from which they were milled in containing less lysine, arginine, aspartate (+ asparagine), glycine and alanine but more glutamate (+ glutamine) and proline. Analyses of manually dissected pericarp, testa, aleurone, starchy endosperm and germ suggest that these differences in composition result from differences in the distribution of protein classes throughout the wheat kernel, for example the proportions of basic amino acids increase and the nitrogen content decreases from the outside towards the centre of the endosperm.[3]

Due to the fact that cystine consists of two cysteine molecules, joined by a disulfide (S-S) bond, cysteine and cystine are interchangeable in wheat. The ratio of cysteine to cystine is dependent on the degree of oxidation in a dough. Addition of an oxidizing agent, such as ascorbic acid, will increase the amount of cystine at the expense of cysteine. This has a "strengthening" effect on the gluten by increasing its elasticity.[2]

Each of the 40 samples analysed for this survey, was hydrolysed in duplicate and the average value of the duplicate results, reported as g amino acid/100 g sample, are provided in Table 7. The results show that the wheat samples tested are deficient in certain essential amino acids, such as tryptophan, lysine, threonine, methionine and histidine. Tryptophan values ranged from 0.13 – 0.19 g/100 g and comprise ± 1.0 – 1.3 % of the total amino acid content. Tryptophan is nutritionally important since it is a precursor for important metabolites such as serotonin and nicotinamide. The World Health Organisation's (WHO) recommended daily dose for tryptohan is 4 mg/kg/day.[4]

The values for lysine ranged from 0.31 – 0.49 g/100 g. Lysine is the precursor for carnitine and is required for the structural modification of collagen together with the amino acids glycine and proline.[1] The WHO recommended daily dose for lysine is 30 mg/kg/day. Threonine values ranged from 0.32 – 0.54 g/100 g and the WHO recommended daily dose is 15 mg/kg/day.[4] Threonine supports digestive function, the immune system, liver and cardiovascular function as well as the central nervous system.[5]

Values for methionine ranged between 0.18 and 0.26 g/100 g. The daily recommendation by the WHO is 15 mg/kg/day for the sulphur containing amino acids in total.[4] The main functions of methionine include building of various protein molecules and the synthesis of the equally important sulphurous amino acid, cysteine.[5]

The values for histidine were between 0.23 and 0.44 g/100 g. This amino acid is involved in the formation of proteins, influences several of the metabolic reactions in the body and assists in regulating pH values of blood. The results also showed that the samples were high in the essential amino acid leucine, with values ranging from 0.70 – 1.32 g/100 g. This amino acid helps to sustain nitrogen balance and energy supply during times of stress. These qualities make this amino acid particularly important for body builders and other athletes that require strength and stamina.

The results showed that the samples were rich in glutamic acid and proline, together contributing ± 42% of the total amino acid content. Glutamic acid contributes to the health of the immune and digestive systems, as well as energy production. Proline is a non-essential amino acid manufactured mainly from ornithine, glutamine and glutamate in the liver and is one of the principal amino acids required by the body for building collagen.[5]

**References:**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# Table 7: Amino acid content of wheat samples originating from different production regions

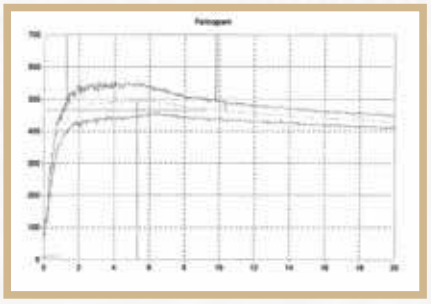
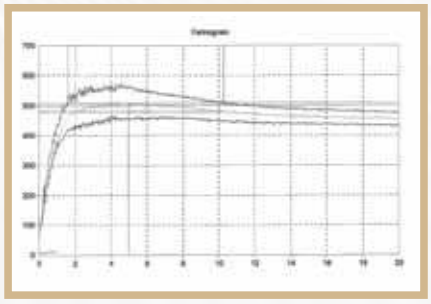
| Region | Class and Grade | Amino Acid | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tryptophan | Methionine | Cystine | Histidine | Serine | Arginine | Glycine | Aspartic acid | Glutamic acid | Threonine | Alanine | Proline | Lysine | Tyrosine | Valine | Isoleucine | Leucine | Phenyl-alanine |
| | | g/100g (as is) | | | | | | | | | | | | | | | | | |
| 1 | UT | 0.18 | 0.24 | 0.37 | 0.30 | 0.67 | 0.56 | 0.56 | 0.65 | 4.26 | 0.40 | 0.45 | 1.40 | 0.36 | 0.30 | 0.59 | 0.44 | 0.91 | 0.65 |
| 2 | UT | 0.13 | 0.23 | 0.39 | 0.25 | 0.54 | 0.49 | 0.46 | 0.59 | 3.24 | 0.34 | 0.39 | 1.06 | 0.32 | 0.25 | 0.50 | 0.37 | 0.74 | 0.50 |
| 2 | B1 | 0.16 | 0.25 | 0.38 | 0.29 | 0.64 | 0.55 | 0.54 | 0.66 | 4.17 | 0.38 | 0.44 | 1.33 | 0.37 | 0.32 | 0.57 | 0.43 | 0.88 | 0.61 |
| 2 | B3 | 0.14 | 0.20 | 0.31 | 0.24 | 0.54 | 0.47 | 0.46 | 0.54 | 3.33 | 0.33 | 0.37 | 1.08 | 0.31 | 0.27 | 0.48 | 0.36 | 0.73 | 0.50 |
| 3 | B2 | 0.15 | 0.23 | 0.38 | 0.27 | 0.59 | 0.53 | 0.51 | 0.61 | 3.68 | 0.36 | 0.41 | 1.22 | 0.34 | 0.28 | 0.53 | 0.40 | 0.81 | 0.56 |
| 3 | B2 | 0.15 | 0.26 | 0.37 | 0.24 | 0.54 | 0.47 | 0.45 | 0.59 | 3.34 | 0.33 | 0.39 | 1.06 | 0.32 | 0.24 | 0.49 | 0.36 | 0.74 | 0.49 |
| 3 | B1 | 0.16 | 0.25 | 0.40 | 0.29 | 0.65 | 0.57 | 0.55 | 0.65 | 4.00 | 0.39 | 0.44 | 1.31 | 0.36 | 0.30 | 0.58 | 0.43 | 0.88 | 0.61 |
| 3 | UT | 0.14 | 0.24 | 0.37 | 0.27 | 0.59 | 0.53 | 0.51 | 0.61 | 3.82 | 0.36 | 0.41 | 1.20 | 0.34 | 0.27 | 0.53 | 0.39 | 0.81 | 0.57 |
| 4 | B1 | 0.16 | 0.25 | 0.40 | 0.29 | 0.63 | 0.56 | 0.53 | 0.63 | 3.88 | 0.38 | 0.43 | 1.28 | 0.35 | 0.30 | 0.56 | 0.42 | 0.86 | 0.59 |
| 4 | B2 | 0.15 | 0.21 | 0.38 | 0.26 | 0.57 | 0.53 | 0.49 | 0.60 | 3.55 | 0.35 | 0.41 | 1.12 | 0.33 | 0.27 | 0.50 | 0.37 | 0.77 | 0.52 |
| 4 | B3 | 0.15 | 0.21 | 0.34 | 0.24 | 0.52 | 0.46 | 0.45 | 0.54 | 3.02 | 0.32 | 0.37 | 1.00 | 0.31 | 0.23 | 0.46 | 0.34 | 0.70 | 0.47 |
| 5 | B3 | 0.16 | 0.18 | 0.39 | 0.26 | 0.58 | 0.49 | 0.49 | 0.62 | 3.65 | 0.35 | 0.41 | 1.16 | 0.34 | 0.26 | 0.52 | 0.38 | 0.79 | 0.53 |
| 5 | B2 | 0.16 | 0.19 | 0.38 | 0.28 | 0.63 | 0.53 | 0.53 | 0.64 | 4.04 | 0.38 | 0.43 | 1.29 | 0.36 | 0.31 | 0.55 | 0.41 | 0.85 | 0.58 |
| 5 | B4 | 0.15 | 0.19 | 0.37 | 0.23 | 0.51 | 0.45 | 0.45 | 0.56 | 3.12 | 0.32 | 0.38 | 0.99 | 0.32 | 0.24 | 0.47 | 0.34 | 0.71 | 0.46 |
| 6 | B3 | 0.15 | 0.23 | 0.36 | 0.25 | 0.55 | 0.50 | 0.49 | 0.60 | 3.40 | 0.34 | 0.40 | 1.08 | 0.33 | 0.27 | 0.50 | 0.37 | 0.75 | 0.51 |
| 6 | B2 | 0.15 | 0.24 | 0.38 | 0.26 | 0.58 | 0.51 | 0.50 | 0.62 | 3.81 | 0.35 | 0.41 | 1.20 | 0.34 | 0.29 | 0.52 | 0.39 | 0.80 | 0.56 |
| 6 | B1 | 0.14 | 0.25 | 0.41 | 0.30 | 0.66 | 0.58 | 0.56 | 0.69 | 4.19 | 0.40 | 0.45 | 1.37 | 0.37 | 0.35 | 0.59 | 0.44 | 0.90 | 0.63 |
| 10 | B2 | 0.17 | 0.22 | 0.35 | 0.28 | 0.61 | 0.53 | 0.53 | 0.61 | 3.90 | 0.36 | 0.42 | 1.28 | 0.34 | 0.32 | 0.53 | 0.40 | 0.83 | 0.57 |
| 10 | B2 | 0.15 | 0.23 | 0.35 | 0.27 | 0.59 | 0.54 | 0.52 | 0.66 | 3.82 | 0.36 | 0.43 | 1.06 | 0.35 | 0.30 | 0.53 | 0.39 | 0.81 | 0.55 |
| 10 | B2 | 0.16 | 0.21 | 0.36 | 0.28 | 0.62 | 0.54 | 0.54 | 0.65 | 4.18 | 0.37 | 0.44 | 1.29 | 0.35 | 0.31 | 0.54 | 0.41 | 0.85 | 0.59 |
| 11 | B2 | 0.16 | 0.19 | 0.39 | 0.28 | 0.62 | 0.55 | 0.53 | 0.69 | 4.06 | 0.37 | 0.44 | 1.28 | 0.35 | 0.30 | 0.55 | 0.41 | 0.85 | 0.59 |

# Table 7: Amino acid content of wheat samples originating from different production regions (continue)

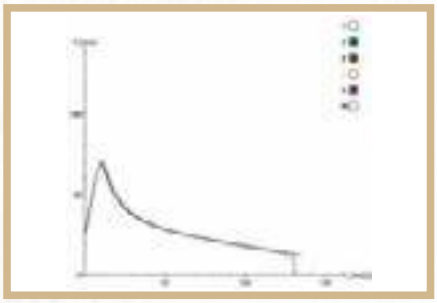
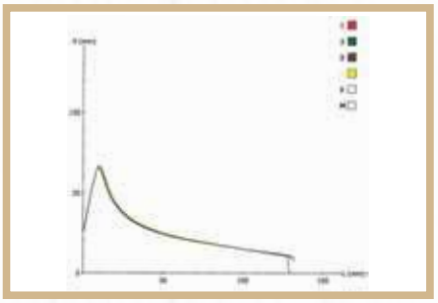
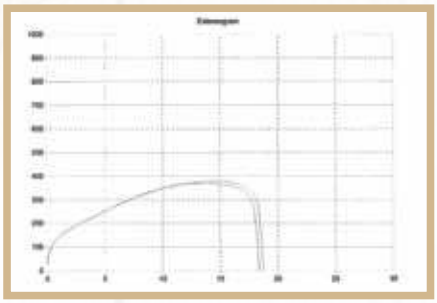
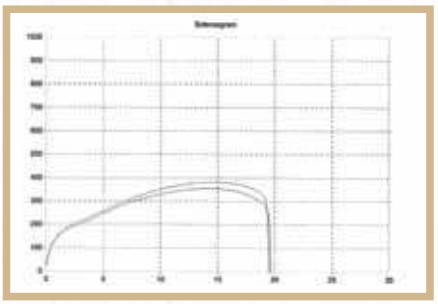
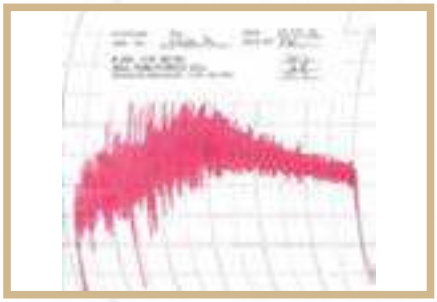
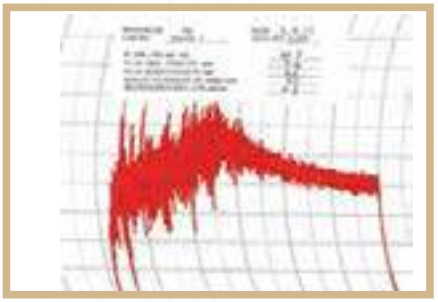
| Region | Class and Grade | Amino Acid | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tryptophan | Methionine | Cystine | Histidine | Serine | Arginine | Glycine | Aspartic acid | Glutamic acid | Threonine | Alanine | Proline | Lysine | Tyrosine | Valine | Isoleucine | Leucine | Phenyl-alanine |
| | | g/100g (as is) | | | | | | | | | | | | | | | | | |
| 12 | B1 | 0.16 | 0.25 | 0.42 | 0.30 | 0.62 | 0.58 | 0.53 | 0.66 | 3.87 | 0.38 | 0.44 | 1.28 | 0.35 | 0.33 | 0.58 | 0.42 | 0.87 | 0.59 |
| 14 | B1 | 0.18 | 0.26 | 0.40 | 0.31 | 0.68 | 0.56 | 0.59 | 0.73 | 4.60 | 0.40 | 0.47 | 1.48 | 0.37 | 0.28 | 0.60 | 0.46 | 0.94 | 0.67 |
| 17 | UT | 0.15 | 0.24 | 0.36 | 0.26 | 0.59 | 0.50 | 0.51 | 0.64 | 3.80 | 0.36 | 0.42 | 1.20 | 0.35 | 0.25 | 0.53 | 0.39 | 0.81 | 0.55 |
| 19 | B2 | 0.17 | 0.23 | 0.35 | 0.27 | 0.57 | 0.49 | 0.50 | 0.60 | 3.78 | 0.35 | 0.41 | 1.20 | 0.33 | 0.24 | 0.52 | 0.38 | 0.79 | 0.54 |
| 20 | B1 | 0.16 | 0.25 | 0.40 | 0.31 | 0.67 | 0.60 | 0.58 | 0.72 | 4.42 | 0.40 | 0.47 | 1.40 | 0.38 | 0.33 | 0.60 | 0.44 | 0.94 | 0.64 |
| 20 | B1 | 0.16 | 0.23 | 0.43 | 0.32 | 0.69 | 0.61 | 0.59 | 0.73 | 4.61 | 0.41 | 0.48 | 1.46 | 0.38 | 0.32 | 0.63 | 0.47 | 0.95 | 0.67 |
| 22 | UT | 0.18 | 0.26 | 0.44 | 0.42 | 0.90 | 0.77 | 0.75 | 0.86 | 6.26 | 0.52 | 0.59 | 2.06 | 0.46 | 0.45 | 0.77 | 0.61 | 1.09 | 0.93 |
| 23 | B2 | 0.19 | 0.26 | 0.55 | 0.44 | 0.93 | 0.83 | 0.77 | 0.88 | 6.39 | 0.54 | 0.61 | 2.18 | 0.49 | 0.49 | 0.82 | 0.66 | 1.32 | 1.01 |
| 24 | B1 | 0.17 | 0.23 | 0.46 | 0.37 | 0.76 | 0.66 | 0.64 | 0.76 | 5.31 | 0.45 | 0.52 | 1.72 | 0.41 | 0.36 | 0.68 | 0.53 | 1.08 | 0.79 |
| 25 | B1 | 0.18 | 0.24 | 0.47 | 0.36 | 0.78 | 0.65 | 0.63 | 0.74 | 5.14 | 0.45 | 0.51 | 1.68 | 0.40 | 0.35 | 0.69 | 0.52 | 1.07 | 0.75 |
| 28 | UT | 0.19 | 0.23 | 0.40 | 0.32 | 0.70 | 0.60 | 0.60 | 0.74 | 4.63 | 0.42 | 0.49 | 1.47 | 0.39 | 0.31 | 0.62 | 0.46 | 0.96 | 0.66 |
| 29 | B1 | 0.17 | 0.23 | 0.44 | 0.31 | 0.68 | 0.59 | 0.58 | 0.70 | 4.42 | 0.40 | 0.47 | 1.41 | 0.38 | 0.32 | 0.61 | 0.45 | 0.93 | 0.64 |
| 32 | B1 | 0.17 | 0.24 | 0.44 | 0.31 | 0.71 | 0.59 | 0.60 | 0.71 | 4.70 | 0.41 | 0.48 | 1.49 | 0.38 | 0.33 | 0.62 | 0.47 | 0.97 | 0.67 |
| 33 | B1 | 0.15 | 0.21 | 0.41 | 0.30 | 0.67 | 0.57 | 0.58 | 0.70 | 4.47 | 0.40 | 0.47 | 1.43 | 0.38 | 0.32 | 0.58 | 0.44 | 0.92 | 0.64 |
| 33 | B2 | 0.17 | 0.21 | 0.36 | 0.27 | 0.59 | 0.54 | 0.53 | 0.64 | 3.77 | 0.36 | 0.43 | 1.19 | 0.35 | 0.29 | 0.53 | 0.39 | 0.82 | 0.54 |
| 34 | B4 | 0.19 | 0.22 | 0.35 | 0.29 | 0.65 | 0.56 | 0.57 | 0.66 | 4.27 | 0.38 | 0.45 | 1.35 | 0.37 | 0.32 | 0.57 | 0.41 | 0.89 | 0.60 |
| 35 | B1 | 0.17 | 0.25 | 0.42 | 0.30 | 0.64 | 0.60 | 0.55 | 0.68 | 3.97 | 0.39 | 0.45 | 1.31 | 0.36 | 0.32 | 0.59 | 0.42 | 0.89 | 0.60 |
| 35 | B2 | 0.16 | 0.25 | 0.39 | 0.29 | 0.65 | 0.59 | 0.57 | 0.67 | 4.05 | 0.39 | 0.45 | 1.33 | 0.36 | 0.35 | 0.58 | 0.43 | 0.88 | 0.60 |
| 36 | B1 | 0.18 | 0.22 | 0.40 | 0.28 | 0.63 | 0.54 | 0.53 | 0.68 | 4.08 | 0.38 | 0.45 | 1.27 | 0.36 | 0.30 | 0.56 | 0.42 | 0.85 | 0.59 |
| **Minimum** | | **0.13** | **0.18** | **0.31** | **0.23** | **0.51** | **0.45** | **0.45** | **0.54** | **3.02** | **0.32** | **0.37** | **0.99** | **0.31** | **0.23** | **0.46** | **0.34** | **0.70** | **0.46** |
| **Maximum** | | **0.19** | **0.26** | **0.55** | **0.44** | **0.93** | **0.83** | **0.77** | **0.88** | **6.39** | **0.54** | **0.61** | **2.18** | **0.49** | **0.49** | **0.82** | **0.66** | **1.32** | **1.01** |

# RSA WHEAT CROP QUALITY SUMMARY

## RSA Crop Quality 2014/2015 and 2016/2017 Seasons

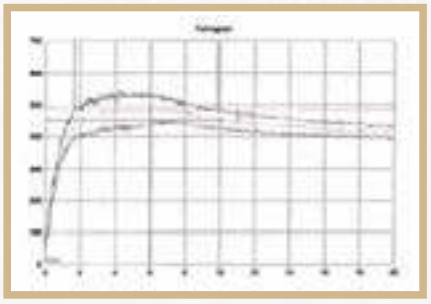
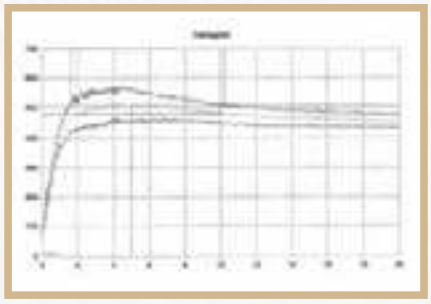
| Country of origin | RSA Crop Average 2014/2015 | | | | | | | RSA Crop Average 2016/2017 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| **No. of samples** | ***105*** | ***59*** | ***42*** | ***17*** | ***89*** | ***25*** | ***337*** | ***130*** | ***91*** | ***33*** | ***28*** | ***48*** | ***7*** | ***337*** |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 12.9 | 11.5 | 10.8 | 9.7 | 11.5 | 11.4 | 11.8 | 13.0 | 11.5 | 11.0 | 11.0 | 11.4 | 13.6 | 12.0 |
| Moisture, % | 11.0 | 11.1 | 11.1 | 12.3 | 11.2 | 11.3 | 11.2 | 9.9 | 9.8 | 9.8 | 9.9 | 9.7 | 10.2 | 9.9 |
| Falling number, sec | 364 | 369 | 375 | 375 | 369 | 364 | 368 | 358 | 361 | 343 | 359 | 349 | 358 | 356 |
| 1000 Kernel mass (13% mb), g | 38.0 | 39.6 | 40.3 | 41.9 | 38.2 | 38.2 | 38.8 | 37.7 | 39.6 | 40.5 | 37.8 | 38.6 | 35.6 | 38.6 |
| Hlm (dirty), kg/hl | 80.9 | 80.7 | 80.6 | 81.0 | 79.1 | 78.6 | 80.2 | 81.7 | 82.0 | 81.8 | 81.5 | 80.7 | 77.7 | 81.5 |
| Screenings (<1.8 mm sieve), % | 1.17 | 1.26 | 1.32 | 1.42 | 2.19 | 2.01 | 1.55 | 1.35 | 1.64 | 1.53 | 2.70 | 3.03 | 4.37 | 1.86 |
| Gravel, stones, turf and glass, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.39 | 0.02 |
| Foreign matter, % | 0.09 | 0.07 | 0.09 | 0.07 | 0.18 | 0.12 | 0.11 | 0.16 | 0.16 | 0.15 | 0.15 | 0.31 | 0.82 | 0.19 |
| Other grain & unthreshed ears, % | 0.42 | 0.44 | 0.43 | 0.38 | 0.98 | 0.58 | 0.58 | 0.34 | 0.36 | 0.29 | 0.29 | 0.74 | 0.44 | 0.40 |
| Heat damaged kernels, % | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Immature kernels, % | 0.13 | 0.05 | 0.05 | 0.04 | 0.10 | 0.03 | 0.09 | 0.04 | 0.03 | 0.04 | 0.01 | 0.04 | 0.03 | 0.03 |
| Insect damaged kernels, % | 0.44 | 0.71 | 0.76 | 0.85 | 1.71 | 1.22 | 0.94 | 0.36 | 0.48 | 0.41 | 0.49 | 0.94 | 0.32 | 0.49 |
| Heavily frost damaged kernels, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sprouted kernels, % | 0.04 | 0.04 | 0.04 | 0.10 | 0.10 | 0.08 | 0.06 | 0.16 | 0.14 | 0.11 | 0.06 | 0.16 | 1.09 | 0.16 |
| Total damaged kernels, % | 0.62 | 0.79 | 0.85 | 0.99 | 1.92 | 1.34 | 1.09 | 0.56 | 0.64 | 0.56 | 0.55 | 1.14 | 1.45 | 0.68 |
| Combined deviations, % | 2.29 | 2.57 | 2.69 | 2.86 | 5.27 | 4.05 | 3.34 | 2.40 | 2.82 | 2.55 | 3.70 | 5.21 | 7.21 | 3.14 |
| Field fungi, % | 0.23 | 0.16 | 0.09 | 0.06 | 0.11 | 1.76 | 0.27 | 0.32 | 0.35 | 0.32 | 0.43 | 0.41 | 0.57 | 0.36 |
| Storage fungi, % | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Live insects | No | No | No | No | No | Yes | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | | | | | | | | | | | | | |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | ***24*** | ***15*** | ***15*** | ***6*** | ***9*** | ***1*** | ***70*** | ***23*** | ***14*** | ***11*** | ***10*** | ***11*** | ***1*** | ***70*** |
| **BÜHLER EXTRACTION, %** | 73.5 | 73.6 | 73.3 | 73.9 | 72.8 | 70.9 | 73.4 | 72.8 | 72.7 | 72.2 | 72.8 | 71.6 | 73.1 | 72.5 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ (wet) | -3.3 | -3.3 | -3.5 | -3.7 | -3.2 | -2.2 | -3.3 | -3.7 | -3.8 | -3.6 | -4.0 | -3.8 | -3.4 | -3.8 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 93.66 | 93.72 | 93.93 | 94.07 | 93.77 | 92.98 | 93.77 | 93.65 | 93.68 | 93.68 | 93.90 | 93.77 | 93.38 | 93.71 |
| a* | 0.47 | 0.45 | 0.41 | 0.39 | 0.41 | 0.56 | 0.44 | 0.46 | 0.49 | 0.44 | 0.45 | 0.43 | 0.44 | 0.46 |
| b* | 9.58 | 9.81 | 9.87 | 9.49 | 9.82 | 9.78 | 9.72 | 9.91 | 10.21 | 10.17 | 10.48 | 10.05 | 10.15 | 10.12 |
| Protein (12% mb), % | 11.9 | 10.5 | 9.7 | 8.9 | 10.9 | 10.9 | 10.7 | 12.1 | 11.1 | 10.7 | 9.9 | 11.2 | 12.6 | 11.2 |
| Wet Gluten (14% mb), % | 31.8 | 28.9 | 25.7 | 24.1 | 30.2 | 27.2 | 28.9 | 33.0 | 30.7 | 29.5 | 25.9 | 31.0 | 34.3 | 30.7 |
| Dry Gluten (14% mb), % | 10.8 | 9.7 | 8.6 | 8.3 | 10.4 | 9.2 | 9.8 | 11.5 | 10.5 | 10.0 | 8.8 | 10.6 | 12.0 | 10.5 |
| Gluten Index | 88 | 86 | 88 | 90 | 86 | 94 | 88 | 95 | 93 | 94 | 96 | 93 | 96 | 94 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 61.8 | 60.3 | 59.4 | 58.7 | 60.7 | 60.3 | 60.6 | 62.4 | 61.3 | 60.8 | 59.7 | 61.3 | 63.0 | 61.3 |
| Loaf volume, $cm^3$ | 938 | 875 | 831 | 786 | 917 | 1132 | 889 | 1104 | 1029 | 987 | 957 | 1036 | 1167 | 1040 |
| Evaluation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 60.6 | 59.2 | 58.7 | 58.0 | 59.7 | 58.0 | 59.5 | 60.8 | 60.1 | 60.2 | 57.8 | 60.3 | 59.7 | 60.1 |
| Development time, min | 6.8 | 4.9 | 3.8 | 3.8 | 5.5 | 4.3 | 5.3 | 6.2 | 5.3 | 5.0 | 3.7 | 4.7 | 6.5 | 5.2 |
| Stability, mm | 10.1 | 6.9 | 7.6 | 6.6 | 8.4 | 6.7 | 8.3 | 9.0 | 8.0 | 7.8 | 7.3 | 8.3 | 9.3 | 8.3 |
| Mixing tolerance index, BU | 30 | 41 | 35 | 39 | 36 | 39 | 35 | 35 | 38 | 39 | 40 | 36 | 34 | 37 |
| |  | | | | | | |  | | | | | | |

## RSA Crop Quality of 2014/2015 and 2016/2017 Seasons

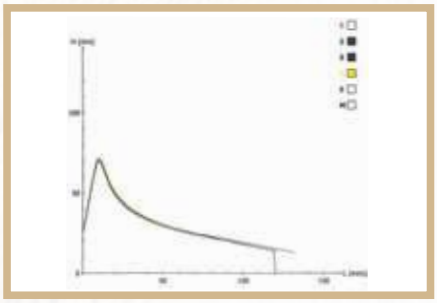
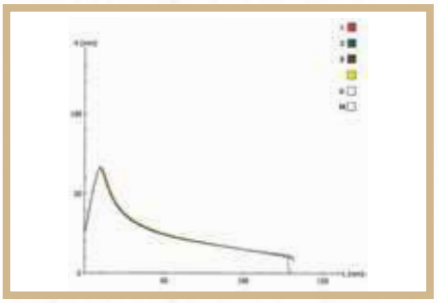
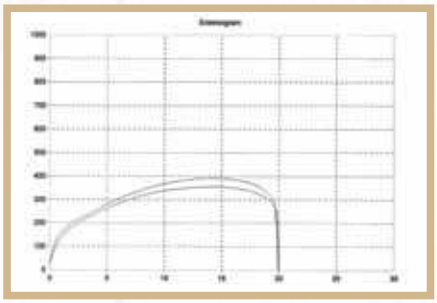
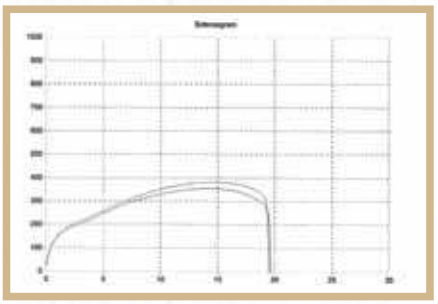
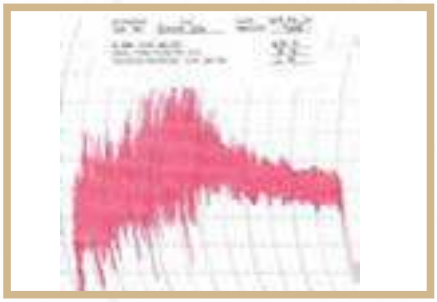
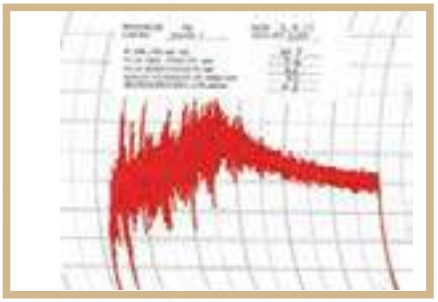
| Country of origin | RSA Crop Average 2014/2015 | | | | | | | RSA Crop Average 2016/2017 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| **No. of samples** | *24* | *15* | *15* | *6* | *9* | *1* | *70* | *23* | *14* | *11* | *10* | *11* | *1* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 46.1 | 34.2 | 34.1 | 28.3 | 37.6 | 26.9 | 38.1 | 42.4 | 34.9 | 34.1 | 31.3 | 36.2 | 37.8 | 37.0 |
| Stability (P), mm | 77 | 71 | 79 | 72 | 72 | 50 | 75 | 74 | 72 | 77 | 69 | 76 | 71 | 73 |
| Distensibility (L), mm | 148 | 136 | 113 | 103 | 139 | 163 | 133 | 155 | 133 | 116 | 126 | 127 | 120 | 135 |
| P/L | 0.53 | 0.55 | 0.75 | 0.71 | 0.54 | 0.31 | 0.59 | 0.49 | 0.57 | 0.68 | 0.56 | 0.61 | 0.59 | 0.57 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 122 | 87 | 85 | 73 | 94 | 74 | 98 | 113 | 93 | 85 | 89 | 97 | 126 | 99 |
| Max. height, BU | 405 | 331 | 351 | 314 | 344 | 238 | 360 | 388 | 359 | 326 | 368 | 348 | 420 | 364 |
| Extensibility, mm | 218 | 191 | 176 | 166 | 198 | 219 | 196 | 210 | 186 | 184 | 168 | 195 | 217 | 193 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 2.8 | 2.6 | 2.8 | 2.7 | 2.5 | 3.1 | 2.7 | 2.6 | 2.5 | 2.6 | 2.8 | 2.5 | 2.9 | 2.6 |
| Absorption, % | 62.0 | 60.4 | 59.6 | 58.8 | 60.8 | 60.8 | 60.7 | 62.4 | 61.1 | 60.9 | 59.9 | 61.4 | 63.0 | 61.4 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | <100 [361] | | | | | | | <100 [501] | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***40*** | | | | | | | ***40*** | | | | | | |

# RSA WHEAT CROP QUALITY SUMMARY

## RSA Crop Quality 2015/2016 and 2016/2017 Seasons

| Country of origin | RSA Crop Average 2015/2016 | | | | | | | RSA Crop Average 2016/2017 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| **No. of samples** | ***124*** | ***56*** | ***18*** | ***11*** | ***39*** | ***4*** | ***252*** | ***130*** | ***91*** | ***33*** | ***28*** | ***48*** | ***7*** | ***337*** |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 | 13.0 | 11.5 | 11.0 | 11.0 | 11.4 | 13.6 | 12.0 |
| Moisture, % | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 | 9.9 | 9.8 | 9.8 | 9.9 | 9.7 | 10.2 | 9.9 |
| Falling number, sec | 401 | 391 | 367 | 405 | 383 | 375 | 393 | 358 | 361 | 343 | 359 | 349 | 358 | 356 |
| 1000 Kernel mass (13% mb), g | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 | 37.7 | 39.6 | 40.5 | 37.8 | 38.6 | 35.6 | 38.6 |
| Hlm (dirty), kg/hl | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 | 81.7 | 82.0 | 81.8 | 81.5 | 80.7 | 77.7 | 81.5 |
| Screenings (<1.8 mm sieve), % | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 | 1.35 | 1.64 | 1.53 | 2.70 | 3.03 | 4.37 | 1.86 |
| Gravel, stones, turf and glass, % | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.39 | 0.02 |
| Foreign matter, % | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 | 0.16 | 0.16 | 0.15 | 0.15 | 0.31 | 0.82 | 0.19 |
| Other grain & unthreshed ears, % | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 | 0.34 | 0.36 | 0.29 | 0.29 | 0.74 | 0.44 | 0.40 |
| Heat damaged kernels, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Immature kernels, % | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 | 0.04 | 0.03 | 0.04 | 0.01 | 0.04 | 0.03 | 0.03 |
| Insect damaged kernels, % | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 | 0.36 | 0.48 | 0.41 | 0.49 | 0.94 | 0.32 | 0.49 |
| Heavily frost damaged kernels, % | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sprouted kernels, % | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 | 0.16 | 0.14 | 0.11 | 0.06 | 0.16 | 1.09 | 0.16 |
| Total damaged kernels, % | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 | 0.56 | 0.64 | 0.56 | 0.55 | 1.14 | 1.45 | 0.68 |
| Combined deviations, % | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 | 2.40 | 2.82 | 2.55 | 3.70 | 5.21 | 7.21 | 3.14 |
| Field fungi, % | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 | 0.32 | 0.35 | 0.32 | 0.43 | 0.41 | 0.57 | 0.36 |
| Storage fungi, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Live insects | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | | | | | | | | | | | | | |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | ***25*** | ***19*** | ***9*** | ***8*** | ***9*** | ***-*** | ***70*** | ***23*** | ***14*** | ***11*** | ***10*** | ***11*** | ***1*** | ***70*** |
| **BÜHLER EXTRACTION, %** | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 | 72.8 | 72.7 | 72.2 | 72.8 | 71.6 | 73.1 | 72.5 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ (wet) | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 | -3.7 | -3.8 | -3.6 | -4.0 | -3.8 | -3.4 | -3.8 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 | 93.65 | 93.68 | 93.68 | 93.90 | 93.77 | 93.38 | 93.71 |
| a* | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 | 0.46 | 0.49 | 0.44 | 0.45 | 0.43 | 0.44 | 0.46 |
| b* | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 | 9.91 | 10.21 | 10.17 | 10.48 | 10.05 | 10.15 | 10.12 |
| Protein (12% mb), % | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 | 12.1 | 11.1 | 10.7 | 9.9 | 11.2 | 12.6 | 11.2 |
| Wet Gluten (14% mb), % | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 | 33.0 | 30.7 | 29.5 | 25.9 | 31.0 | 34.3 | 30.7 |
| Dry Gluten (14% mb), % | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 | 11.5 | 10.5 | 10.0 | 8.8 | 10.6 | 12.0 | 10.5 |
| Gluten Index | 95 | 95 | 95 | 95 | 94 | - | 95 | 95 | 93 | 94 | 96 | 93 | 96 | 94 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 | 62.4 | 61.3 | 60.8 | 59.7 | 61.3 | 63.0 | 61.3 |
| Loaf volume, $cm^3$ | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 | 1104 | 1029 | 987 | 957 | 1036 | 1167 | 1040 |
| Evaluation | 0 | 0 | 0 | 1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 | 60.8 | 60.1 | 60.2 | 57.8 | 60.3 | 59.7 | 60.1 |
| Development time, min | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 | 6.2 | 5.3 | 5.0 | 3.7 | 4.7 | 6.5 | 5.2 |
| Stability, mm | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 | 9.0 | 8.0 | 7.8 | 7.3 | 8.3 | 9.3 | 8.3 |
| Mixing tolerance index, BU | 37 | 39 | 38 | 39 | 36 | - | 38 | 35 | 38 | 39 | 40 | 36 | 34 | 37 |
| |  | | | | | | |  | | | | | | |

## RSA Crop Quality of 2015/2016 and 2016/2017 Seasons

| Country of origin | RSA Crop Average 2015/2016 | | | | | | | RSA Crop Average 2016/2017 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| No. of samples | *25* | *19* | *9* | *8* | *9* | *-* | *70* | *23* | *14* | *11* | *10* | *11* | *1* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 | 42.4 | 34.9 | 34.1 | 31.3 | 36.2 | 37.8 | 37.0 |
| Stability (P), mm | 83 | 83 | 78 | 78 | 79 | - | 81 | 74 | 72 | 77 | 69 | 76 | 71 | 73 |
| Distensibility (L), mm | 120 | 104 | 108 | 127 | 117 | - | 115 | 155 | 133 | 116 | 126 | 127 | 120 | 135 |
| P/L | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 | 0.49 | 0.57 | 0.68 | 0.56 | 0.61 | 0.59 | 0.57 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 114 | 94 | 100 | 111 | 105 | - | 105 | 113 | 93 | 85 | 89 | 97 | 126 | 99 |
| Max. height, BU | 395 | 357 | 365 | 367 | 359 | - | 373 | 388 | 359 | 326 | 368 | 348 | 420 | 364 |
| Extensibility, mm | 207 | 186 | 187 | 207 | 204 | - | 198 | 210 | 186 | 184 | 168 | 195 | 217 | 193 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 | 2.6 | 2.5 | 2.6 | 2.8 | 2.5 | 2.9 | 2.6 |
| Absorption, % | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 | 62.4 | 61.1 | 60.9 | 59.9 | 61.4 | 63.0 | 61.4 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | <100 [593] | | | | | | | <100 [501] | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***40*** | | | | | | | ***40*** | | | | | | |

# METHODS

## GRADING:

Full grading was conducted in accordance with the Regulations relating to the grading, packing and marking of bread wheat intended for sale in the Republic of South Africa (No. R. 64 of 29 January 2016). Please see pages 105 to 118.

Hectolitre mass, screenings, protein and falling number were determined. The determination of deviations relating to wheat kernels comprised foreign matter including gravel, stones, turf and glass; other grain and unthreshed ears; damaged kernels including heat-damaged kernels, immature kernels, insect-damaged kernels and sprouted kernels; heavily frost-damaged kernels; field fungi; storage fungi; ergot; noxious seeds; possible presence of undesirable odours and live insects.

Hectolitre mass means the mass in kilogram per hectolitre and was determined according to ISO 7971-3 by means of the Kern 222 instrument.

During earlier seasons the hectolitre mass was determined by means of the Two-level funnel method. In the 2009/2010 season the hectolitre mass value was adjusted by the addition of 2 kg/hl to all hectolitre mass values as per an Industry-wide Hectolitre Mass Dispensation published by the National Department of Agriculture.

**Hectolitre mass** provides a measure of the bulk density of grain and is also useful as a guide to grain soundness and potential milling extraction (flour yield).

**Screenings** means all material that passes through a standard sieve. For the definition of a standard sieve please refer to the definitions of Regulation No. R. 64 on page 107 of this report.

**Damaged wheat** means wheat -
(a) which have been damaged by insects;
(b) which have been distinctly discoloured (orange-brown, dark brown or black) by external heat or as a result of heating caused by internal fermentation in wheat with an excessive moisture content, excluding wheat kernels in respect of which the discolouration is confined to the germ end;
(c) which are immature and have a distinctly green colour; and
(d) in which germination has proceeded to such an extent that the skin covering the embryo has been broken or the developing sprouts and/or rootlets are clearly visible.

**Combined deviations** means the sum of the percentages screenings, other grain and unthreshed ears, foreign matter and damaged kernels.

## THOUSAND KERNEL MASS:

This is the weight in grams of one thousand kernels of grain and provides a measure of grain size and density. This determination does not include kernels that are broken or chipped and is done according to Industry Accepted Method 008.

## FALLING NUMBER MILLING:

At least 300 g of wheat is cleaned by using the standard 1.8 mm sieve and by removing coarser impurities by hand. The sample is then milled on a falling number hammer mill fitted with a 0.8 mm screen.

## NEAR INFRARED SPECTROSCOPY (NIRS):

NIRS is a measurement technique based on the fact that the constituents to be measured, absorb electromagnetic radiation in the near infrared region of the electromagnetic spectrum. The moisture and protein content of the whole wheat flour and Quadromat milled flour samples are measured with a SpectraStar 2400 NIR Analyser RTW.

The calibration on the NIR was developed by the SAGL and is verified by analyzing every fifth sample by means of the primary methods, described on the next page under Moisture and Protein.

## FALLING NUMBER:

This method is based upon the rapid gelatinization of an aqueous suspension of meal or flour in a boiling water bath and subsequent measurement of the liquefaction of the starch paste by the alpha-amylase in the sample. The method measures the enzyme activity, mainly the α-amylase activity.

ICC Standard No. 107/1, latest edition is used to determine the falling number. Only the altitude-corrected value is reported.

## QUADROMAT JUNIOR MILLING:

Cleaned wheat samples are conditioned by adding 3 ml water per 100 g wheat, 18 hours prior to milling. The samples are then milled on the Quadromat Junior laboratory mill.

## BüHLER MILLING:

Cleaned wheat samples are conditioned to between

15.0% and 16.0% moisture according to the wheat moisture and kernel hardness and allowed to stand for a minimum of 18 hours (18 - 24 hours). Samples are then milled on a Bühler MLU 202 mill and passed through a bran finisher.

## BüHLER EXTRACTION:

The extraction represents the flour yield after milling plus flour obtained from bran that passed through a bran finisher. Flour extraction is calculated from the mass of the total products. The Bühler MLU 202 mill is set for South African wheat, mill settings and sieve sizes deviate from AACCI method 26-21.02, latest edition.

## MOISTURE:

ICC Standard No. 110/1, latest edition is used to determine the moisture content of wheat flour. This method determines moisture content as a loss in weight of a sample when dried in an oven at 130 °C for 90 minutes for flour or 2 hours for whole wheat flour.

## PROTEIN:

The Dumas combustion analysis technique is used, according to AACCI method 46-30.01, latest edition.

This method prescribes a generic combustion method for the determination of crude protein. Combustion of the sample at high temperature (1 100 °C) in pure oxygen sets nitrogen free, which is measured by thermal conductivity detection. The total nitrogen content of the whole wheat flour and flour samples are determined and converted to equivalent protein by multiplication with a factor of 5.7 to obtain the protein content.

## COLOUR:

Colour is one of the important properties of milled grains and the colour of wheat flour often affects the colour of the finished product. Generally speaking, a bright white colour flour is more desirable for most products.

The Kent Jones colour (so called wet colour) is determined by following FTP Method No. 0007/3, 7/1991. This method determines the influence of bran and/or extraneous material present in flour by measuring the reflectance of a flour-water slurry at a wavelength of 540 nm. The lower the Kent Jones colour, the lighter/brighter the flour and vice versa.

The dry colour of wheat flour can be measured accurately and precisely with the Minolta CM-5 spectrophotometer. CIE L*a*b* (CIELAB) is a colour model using lightness (L*) and two colour values (a* and b*). The colour coordinates define where a specific colour lies in a Cartesian graph. L* represents lightness (100 being white and 0 being black), a* represents green to red variation and b* represents variation from blue to yellow. The results reported are for the 10° observer and D65 illuminant.

## ASH:

Ash is defined as the quantity of mineral matter that remains as incombustible residue, after incineration of a sample in a muffle furnace by application of the described working method. The ash constituents of wheat are taken from the minerals of the soil. The total mineral content as well as the relative proportions of individual elements depend largely upon the soil, rainfall and other climatic conditions during growth.

Since the level of minerals present in flour is related to the rate of extraction, the ash content also indicates milling performance by indirectly revealing the amount of bran contamination. In-house method No. 011, based on the AACCI method 08-02.01 Rapid (Magnesium Acetate) method, is used for the determination.

## RAPID VISCO ANALYSER:

AACCI method 76-21.01, latest edition, is followed to prepare a complete pasting curve by means of the Rapid Visco Analyser (RVA). The RVA is a rotational viscometer, able to continuously record the viscosity of a sample (under controlled temperature conditions) as the starch granules hydrate, swell and disintegrate (gelatinization and pasting), followed by possible realignment of the starch molecules during cooling (retrogradation).

Maximum viscosity before the onset of cooling (**peak viscosity**), **time to peak** viscosity, **minimum viscosity** after peak (trough) and **final viscosity** are measured and provide indications of the pasting properties of the samples and therefore its processing value for baking and other applications.

The results are reported in centipoise (cP). Results can also be converted to RVU (rapid visco unit), 1 RVU = 12 cP.

## GLUTEN:

Wheat gluten is the water-insoluble complex protein fraction present in wheat flours. The ability of wheat flour to produce dough with good gas retaining

properties is attributed to gluten. Gluten is a plastic elastic substance composed principally of two functional protein components. Glutenin, the high molecular weight fraction, contributes elasticity (is less extensible) and Gliadin, the low molecular weight fraction, provides the viscous component (is highly extensible and less elastic).

The gluten content of wheat flour is determined by means of AACCI Method 38-12.02, latest edition. Wet gluten is washed from meal or flour by an automatic washing apparatus (Glutomatic).

The wet gluten is dried under standardized conditions in a Glutork to obtain the dry gluten. The total wet and total dry gluten contents are expressed as percentages of the sample on a 14% moisture basis.

Wet gluten content correlates to loaf volume and dry gluten content to the crude protein content. The difference between the wet and dry gluten contents is an indication of the water-holding capacity of the gluten proteins, which is in turn, related to flour water absorption.

The gluten index is the ratio of the wet gluten remaining on the sieve (after centrifugation) to the total wet gluten. The gluten index provides an indication of the gluten strength and is not influenced by the protein content.

## FARINOGRAPH:

AACCI method 54-21.02, latest edition constant flour weight procedure is followed, using 300 g of flour on a 14% moisture basis.

The farinograph measures and records the resistance of a dough to mixing, as it is formed from flour and water, developed and broken down. This resistance is called consistency. The dough is subjected to a prolonged, relatively gentle mixing action.

The **water absorption** is the amount of water required for a dough to reach a definite consistency (500 Brabender units). The amount of water added to the flour is expressed as a percentage of the flour mass and reported on a 14% moisture basis.

The **development time**, measured in minutes, is the time from the beginning of water addition until the dough reaches its optimum consistency and the point immediately before the first indication of weakening. A long mixing time can be associated with flours with a high percentage of gluten-forming proteins.

The **stability**, measured in minutes, is the time during which the top of the curve intercepts a horizontal line through the centre of the curve. This gives an indication of the dough's tolerance to mixing: the longer the stability, the longer the mixing time that the dough can withstand. A dough with a longer stability can also withstand a longer fermentation period.

The **mixing tolerance index** (MTI) value is the difference, in Brabender units (BU), between the top of the curve at the peak and the top of the curve measured 5 minutes after the peak is reached. The value gives an indication of the extent to which breakdown of the dough occurs. The higher the value, the more and the quicker the breakdown of the dough occurs. This value is similar to the mixogram tail height.

## EXTENSOGRAPH:

The extensograph measures the resistance and extensibility of a fully mixed, relaxed flour-water dough, by measuring the force required to stretch the dough with a hook until it breaks. ICC Standard No. 114/1, latest edition is followed.

The **strength**, measured in $cm^2$, gives an indication of the total force (work) needed to stretch the dough and is represented by the area under the curve.

The **maximum height/resistance**, measure in BU, gives an indication of the dough's resistance to stretching and is measured as the mean of the maximum heights of the curves of the two test pieces.

The **extensibility**, measured in millimeters, is the mean length at the base of the two curves and indicates the stretch ability of the dough.

## ALVEOGRAPH:

The alveograph measures the resistance of the dough to stretching and also how extensible the dough is. The alveograph stretches the dough in more than one direction (as is happening during proofing), whereas the extensograph stretches the dough in only one direction. ICC Standard No. 121, latest edition is followed.

**Strength** (S): The area under the curve gives an indication of the dough strength and is measured in $cm^2$.

**Stability** (P): Obtained by multiplying the maximum height of the curve with a constant factor of 1.1. This value is an indication of the resistance of the dough to extension (force required to blow the bubble of dough) and is measured in millimetres.

**Distensibility** (L): The length of the curve, measured along the base line in millimetres, corresponds to the maximum volume of air that the bubble can withhold. Provides an indication of the extensibility of the dough.

P/L-value: This ratio is obtained by dividing the P-value by the L-value, thus providing an approximate indication of the shape of the curve that combines stability and extensibility (viscoelastic properties).

## MIXOGRAPH:

A 35 g mixograph is used. The amount of flour weighed is adjusted according to the flour moisture content and the amount of water added to the flour is adjusted according to the flour protein content. Industry Accepted Method 020 based on AACCI method 54-40.02, latest edition is followed.

**Mixogram peak time** is the time measured in minutes that dough takes to reach its maximum consistency or first indication of dough weakening. The peak time is a measure of optimum dough development and thus a measure of protein quality.

**Mixogram tail height** at 6 minutes is the distance in millimetres measured from the base line of the paper at 6 minutes to the graph centre point at 6 minutes. This figure is an indication of the weakening effect of the dough. Higher values indicate flours that are more tolerant to mixing.

## 100 g BAKING TEST:

This procedure, according to Industry Accepted Method 022 based on AACCI Method 10-10.03, latest edition, provides an optimized bread-making method for evaluating bread wheat flour quality and a variety of dough ingredients by a straight-dough method in which all ingredients are incorporated in the initial mixing step.

Keys for the evaluation of the 100 g Baking test:
0 - Excellent
1 - Very Good
2 - Good
3 - Questionable
4 - Poor
5 - Very Poor
6 - Extremely Poor

***Please note:*** This 100 g Baking test evaluation does not give an indication of the baking quality of the flour, but refers to the relationship between the protein content and the bread volume.

## AMINO ACID PROFILE:

The protein bound amino acids (Aspartic acid (Asp), Glutamic acid (Glu), Serine (Ser), Glycine (Gly), Histidine (His), Arginine (Arg), Threonine (Thr), Alanine (Ala), Proline (Pro), Tyrosine (Tyr), Valine (Val), Isoleucine (Ileu), Leucine (Leu), Phenylalanine (Phe) and Lysine (Lys)) were determine by using In-house method No. 028, (AccQ-Tag method).

Samples (400 mg) are hydrolysed with 6 N hydrochloric acid (HCl) for 24 hours and then derivatized with 6-aminoquinolyl-N-hydroxysuccinimidyl carbomate (AQC) to produce stable derivatives. These amino acids are then analysed by a reverse phase UPLC method, using a Waters Acquity H-Class UPLC with Empower software (Waters, Millipore Corp., Milford, MA).

In-house method No. 15, where the sample is first oxidized and dried, was followed for the determination of Cysteine (as Cysteic acid) and Methionine (as Methionine sulfone). The samples were then analysed with liquid chromatography using a modified Pico-Tag method.

For the determination of Tryptophan according to In-house method No. 007, the samples are hydrolysed under alkaline conditions with a saturated barium hydroxide solution heated to 110 °C for 20 hours. The hydrolysate is analysed by reverse phase liquid chromatography with UV detection at 285 nm. All the samples were hydrolysed in duplicate.

## MYCOTOXIN ANALYSES:

Mycotoxins are secondary metabolites produced by fungi on agricultural commodities intended for human and animal consumption. These mycotoxins are potentially dangerous to humans and animals since they are, amongst other also carcinogens. Aside from health risks, mycotoxin contamination can also reduce the value of the crops. Environmental factors such as temperature, humidity, soil and storage conditions influence toxin production.

SAGL implements a validated SAGL In-house multi-mycotoxin screening method using UPLC - MS/MS. 40 of the 337 wheat crop samples were tested for Aflatoxin $B_1$; $B_2$; $G_1$; $G_2$, Fumonisin $B_1$; $B_2$; $B_3$, Deoxynivalenol, 15-ADON, HT2 Toxin, T-2 Toxin, Zearalenone and Ochratoxin A.

# Wheat Imports and Exports

## WHEAT EXPORTS/IMPORTS PER COUNTRY

**2015/2016 Season (26 Sep 2015 - 30 Sep 2016)**

| RSA EXPORTS | | IMPORTS FOR RSA | | IMPORTS FOR OTHER COUNTRIES | | EXPORTS OF IMPORTED WHEAT | | IMPORTS PER HARBOUR | |
|---|---|---|---|---|---|---|---|---|---|
| **To Country** | **Tons** | **From Country** | **Tons** | **From Country** | **Tons** | **To Country** | **Tons** | **Harbour** | **Tons** |
| Botswana | 5 854 | Argentina | 49 516 | Argentina | 8 780 | Botswana | 95 760 | Cape Town | 187 210 |
| Lesotho | 5 004 | Australia | 38 457 | Australia | 19 404 | Lesotho | 87 321 | Durban | 1 921 068 |
| Mozambique | 2 490 | Canada | 102 816 | Canada | 11 986 | Swaziland | 46 522 | East London | 106 725 |
| Namibia | 13 515 | Germany | 283 451 | Germany | 8 867 | Zambia | 2 643 | Port Elizabeth | 79 733 |
| Swaziland | 1 011 | Lithuania | 151 047 | Lithuania | 22 230 | Zimbabwe | 31 340 | Richards Bay | 34 044 |
| Zambia | 269 | Poland | 185 036 | Poland | 13 938 | | | | |
| Zimbabwe | 25 865 | Russian Federation | 956 705 | Russian Federation | 148 673 | | | | |
| | | Ukraine | 109 350 | Ukraine | 16 505 | | | | |
| | | United States | 186 387 | United States | 15 632 | | | | |
| | | | | | | | | | |
| **Total** | **54 008** | **Total** | **2 062 765** | **Total** | **266 015** | **Total** | **263 586** | **Total** | **2 328 780** |

## WHEAT EXPORTS/IMPORTS PER COUNTRY

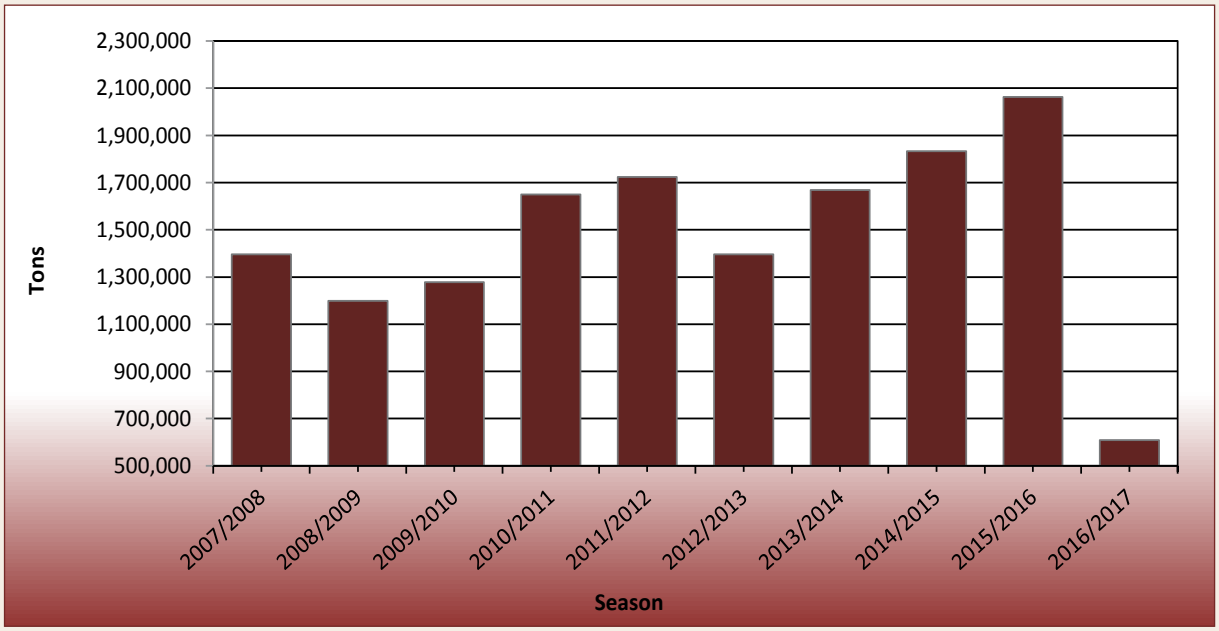
**2016/2017 Season (1 Oct 2016 - 7 Jul 2017)**

| RSA EXPORTS | | IMPORTS FOR RSA | | IMPORTS FOR OTHER COUNTRIES | | EXPORTS OF IMPORTED WHEAT | | IMPORTS PER HARBOUR | |
|---|---|---|---|---|---|---|---|---|---|
| **To Country** | **Tons** | **From Country** | **Tons** | **From Country** | **Tons** | **To Country** | **Tons** | **Harbour** | **Tons** |
| Botswana | 17 841 | Argentina | 35 613 | Argentina | 5 853 | Botswana | 67 229 | Durban | 718 077 |
| Lesotho | 18 106 | Canada | 27 841 | Canada | 12 917 | Lesotho | 59 997 | East London | 51 237 |
| Mozambique | 2 992 | Czech Republic | 140 242 | Czech Republic | 28 802 | Swaziland | 24 825 | Port Elizabeth | 12 940 |
| Namibia | 7 597 | Germany | 217 338 | Germany | 46 055 | Zambia | 4 999 | | |
| Swaziland | 2 531 | Poland | 76 834 | Poland | 14 008 | Zimbabwe | 14 596 | | |
| Zambia | 15 312 | Romania | 16 552 | Romania | 4 650 | | | | |
| Zimbabwe | 22 438 | Russian Federation | 69 588 | Russian Federation | 55 389 | | | | |
| | | United States | 25 026 | United States | 5 546 | | | | |
| **Total** | **86 817** | **Total** | **609 034** | **Total** | **173 220** | **Total** | **171 646** | **Total** | **782 254** |

# Quantity of wheat imported to the RSA

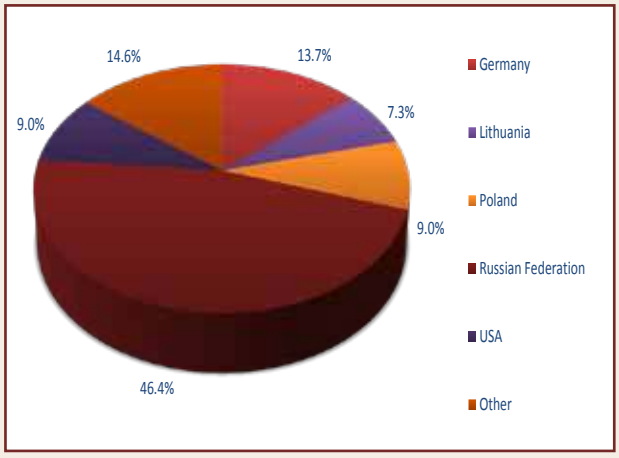
The graphs and table given below and on the next page, are based on progressive import figures per country provided by SAGIS.

### Graph 23: Total wheat imports for domestic use from the 2007/2008 season

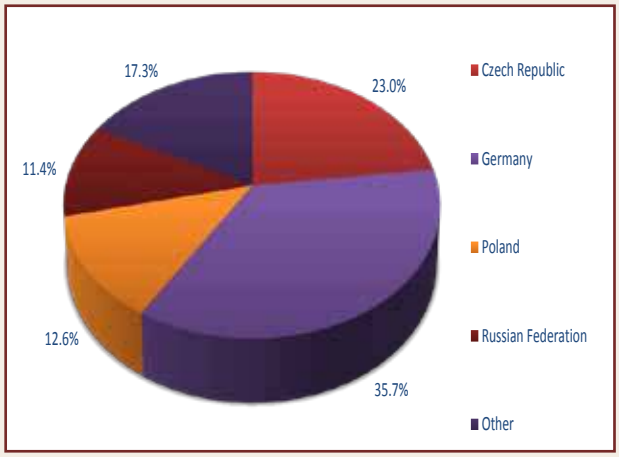



*2016/2017 season figure includes imports up to 7 July 2017.

### Graph 24: Wheat imports per origin for domestic use 2015/2016 season




### Graph 25: Wheat imports per origin for domestic use 2016/2017 season




*2016/2017 season figure includes imports up to 7 July 2017.

# Table 8: Total wheat imports per country per season for use in RSA

| | Season | | | | | | | | | | Total (Tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017* | |
| Argentina | 684 160 | 368 739 | - | 629 600 | 652 279 | 98 029 | - | 59 607 | 49 516 | 35 613 | **2 577 543** |
| Australia | - | 74 714 | 55 312 | 181 637 | 247 675 | 189 925 | 49 780 | 95 254 | 38 457 | - | **932 754** |
| Brazil | - | 42 449 | 123 944 | 58 551 | 276 420 | 234 733 | - | - | - | - | **736 097** |
| Canada | 194 764 | 54 831 | 72 911 | 79 697 | 45 252 | 48 583 | 111 289 | 105 457 | 102 816 | 27 841 | **843 441** |
| Czech Republic | - | - | - | - | - | - | - | - | - | 140 242 | **140 242** |
| Finland | - | - | - | - | - | - | 25 430 | - | - | - | **25 430** |
| France | - | - | - | - | - | - | - | - | - | - | **0** |
| Germany | 111 013 | 518 002 | 809934 | 88 581 | 105 964 | 95 476 | 179 436 | 348 385 | 283 451 | 217 338 | **2 757 580** |
| Latvia | - | - | - | - | - | - | 22 013 | 61 005 | - | - | **83 018** |
| Lesotho | - | - | - | - | - | 384 | - | - | - | - | **384** |
| Lithuania | - | - | 1 611 | - | 8 880 | - | 40 532 | 43 791 | 151 047 | - | **245 861** |
| Poland | - | 13 013 | - | - | - | - | - | 91 483 | 185 036 | 76 834 | **366 366** |
| Romania | - | - | - | - | 36 071 | - | - | - | - | 16 552 | **52 623** |
| Russian Federation | - | - | - | - | 154 129 | 245 228 | 800 964 | 719 784 | 956 705 | 69 588 | **2 946 398** |
| Swaziland | - | - | - | - | - | 288 | | - | - | - | **288** |
| UK | - | - | - | - | - | - | - | - | - | - | **0** |
| Ukraine | - | 13 521 | 41 230 | - | 39 016 | 341 976 | 372 500 | 279 364 | 109 350 | - | **1 196 957** |
| Uruguay | - | - | - | 25 249 | 45 250 | 99 033 | - | - | - | - | **169 532** |
| USA | 406 562 | 113 434 | 173 030 | 586 200 | 112 915 | 42 572 | 66 468 | 28 311 | 186 387 | 25 026 | **1 740 905** |
| **Total** | **1 396 499** | **1 198 703** | **1 277 972** | **1 649 515** | **1 723 851** | **1 396 227** | **1 668 412** | **1 832 441** | **2 062 765** | **609 034** | **14 815 419** |

*2016/2017 season figures include imports up to 7 July 2017.

# Quality summary of imported wheat (1 October 2015 to 30 September 2016) (Previous season)

The quality of all wheat imported into South Africa is monitored by the SAGL. A subsample of all samples drawn by inspectors of the South African Agricultural Food, Quarantine and Inspection Services (SAAFQIS) of the Department of Agriculture, Forestry and Fisheries (DAFF) is forwarded to the SAGL for analysis. To assist with quality comparisons between local and imported wheat, the same scope of analysis is used for both sets of samples. The import quality results are published at the end of each production and marketing season.

For grading as well as dough and baking quality results of the imported wheat per country, please refer to pages 81 to 98. This imported wheat quality is compared to a summary of the local crop quality of the same (2015/2016) season. To simplify the comparison between the quality of the different countries of import and South African wheat, the average quality per country was summarised in Table 9 on pages 79 to 80. The minimum, maximum and standard deviation per country was also calculated. Please also take note of the number of samples analysed when comparing results, the higher the number of samples, the more reliable the average result will be.

A total number of 200 samples of wheat imported from the following countries were received (number of samples received in brackets): Argentina (9), Australia (11), Canada (14), Germany (25), Lithuania (17), Poland (20), Russian Federation (69), Ukraine (5) and USA (30). Wheat imported for purposes other than bread baking (e.g. soft types for biscuit making) is included in this data set.

Most of the wheat imported to South Africa is blended with local wheat to obtain a certain milling and baking quality as per individual company specifications. Milling companies will blend higher and lower quality wheat to obtain the most cost effective grist formulation that conforms to a specific quality. The main objective is to supply the most constant quality of flour to their customers (bakers) as possible, as in the end, consistency is one of the most important quality parameters.

Towards the end of the production season, it may however become necessary for milling companies to mill wheat blends consisting only of imported wheat. Transportation cost is also an important factor for consideration. The grist formulation of mills situated at the coast will as a result consist mainly of imported wheat whereas inland mills will mill a combination of local and imported wheat.

Hectolitre mass, providing an indication of flour extraction potential, did not pose problems with these imported samples, since only 14 of the samples (7%) had hectoliter mass values below 77 kg/hl (minimum requirement for South African grade B1 wheat). All but two of these samples originated from the Russian Federation and the USA.

Screenings represent all material that passes through a standard sieve (1.8 mm), with 3% the maximum allowed for grades 1 to 3 according to RSA grading regulations. Screenings are removed prior to milling and high percentages can indicate potential financial losses. When comparing screening results originating from different countries, it is important to keep in mind that sieve aperture size and shape as well as sample preparation procedures vary between countries. Samples from the Russian Federation and USA had the highest average levels of screenings.

None of the samples reported falling number results below 220 seconds. The wheat samples imported from Australia had the highest falling number values as in the previous two seasons.

The protein content and rheological characteristics of the wheat imported from the USA varied from low and weak to average and good. The average values are therefore not a true reflection of the overall imported USA wheat bread baking quality, since most of the wheat imported were most probably not intended for bread baking purposes.

The ability of wheat flour to produce dough with good gas-holding capability is attributable to gluten as gluten imparts the elasticity and extensibility characteristics to the dough. Good quality gluten is capable of producing a loaf of bread with a high volume and good crumb texture. As in the previous season, the imported Canadian wheat had the highest protein content resulting in the highest gluten content. When evaluating gluten results, it is important to take the protein content into account. The ratio of wet gluten to total protein content is normally between 2.5 – 2.8 to 1. The wet gluten content of good quality white bread flour normally ranges between 27 – 33% (14% mb). The difference between wet and dry gluten is an indication of the water-holding capacity of the gluten proteins which is in turn related to protein quality. This water-holding capacity is also one of the factors determining flour water absorption.

Flour with higher water absorption is preferred by bakers as this results in increased dough yields. The acceptable range for white bread flour is normally between 60.0 – 64.0%, averaging 61.0 – 62.0%. In general, longer farinogram development times of 3.5 to 6.0 minutes and stabilities of 8.0 to 12.0 minutes will be an indication of good baking quality, which is associated with good protein quality.

Acceptable ranges for the alveogram parameters generally are as follows: Strength 30 – 45 $cm^2$, stability (P) 65 – 120 mm, distensibility (L) 80 – 120 mm and P/L 0.70 – 1.50. A good correlation exists between alveogram strength and protein quality. Low/short distensibility values, indicated by high P/L values can result in lower loaf volumes. High/long distensibility values, are indicative of soft doughs with excess stretching properties, which can also result in low loaf volumes as a result of poor gas retention properties. In general, extensogram strength values ranging between 80 – 150 $cm^2$, maximum heights of 300 – 550 BU and extensibility values of 170 – 220 mm, indicate good baking quality.

Most of the imported wheat samples, again showed a tendency towards longer mixogram mixing times. Some of these long mixing times can be explained by a low protein content of the sample. Flours having undesirably low protein starch ratios, require more time to produce continuous protein phases during mixing. Mixing times between 2.8 and 3.5 minutes are considered to be acceptable in South Africa.

Composite samples of holds per shipment per country were tested for the presence of mycotoxin residues by means of a multi-mycotoxin analysis. The mycotoxin results in general did not raise any concerns. Deoxynivalenol (DON), HT-2 toxin and Zearalenone residues were observed on some of the samples. Only one sample from the USA exceeded the EU maximum limits with regards to DON on unprocessed cereals (1 250 µg/kg). This value was however below the national maximum DON level of 2 000 µg/kg for cereal grains intended for further processing. The same sample also exceeded the EU maximum limits with regards to Zearalenone on unprocessed cereals (100 µg/kg) as did one other sample from the USA.

# Table 9: Average quality results of imported wheat during the 2015/2016 season (previous season)

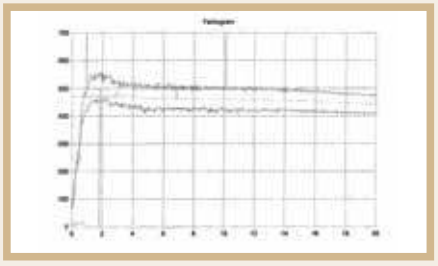
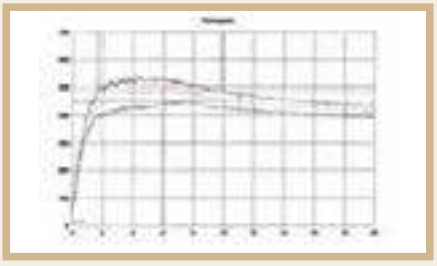
| Quality parameter | Argentina | | | | Australia | | | | Canada | | | | Germany | | | | Lithuania | | | | RSA crop average 2015/2016 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev |
| HIm, kg/hl | **79.6** | 78.5 | 81.1 | 0.75 | **82.4** | 76.5 | 84.0 | 2.57 | **81.6** | 80.1 | 82.2 | 0.69 | **79.5** | 71.8 | 82.8 | 2.08 | **80.8** | 77.0 | 82.6 | 1.24 | **81.1** | 71.2 | 86.2 | 2.07 |
| Screenings, % | **2.77** | 1.45 | 3.29 | 0.59 | **2.20** | 1.44 | 3.17 | 0.50 | **2.34** | 1.62 | 3.03 | 0.46 | **2.58** | 1.63 | 5.00 | 0.88 | **2.89** | 2.25 | 4.27 | 0.52 | **1.71** | 0.10 | 10.28 | 1.04 |
| 1000 kernel mass, g (13% mb) | **32.1** | 29.0 | 38.3 | 2.58 | **37.2** | 34.3 | 40.2 | 1.99 | **33.8** | 31.1 | 38.4 | 2.58 | **44.2** | 40.7 | 45.9 | 1.17 | **42.4** | 40.3 | 44.3 | 1.22 | **36.8** | 22.6 | 50.6 | 3.49 |
| WWF Protein, % (12% mb) | **10.8** | 10.1 | 11.3 | 0.43 | **12.8** | 11.9 | 13.5 | 0.76 | **14.1** | 11.6 | 14.9 | 0.91 | **11.1** | 10.6 | 13.0 | 0.48 | **11.3** | 10.7 | 12.5 | 0.46 | **12.8** | 8.9 | 18.7 | 1.16 |
| WWF Falling number, sec | **361** | 249 | 425 | 47.48 | **495** | 414 | 617 | 73.46 | **379** | 292 | 448 | 38.24 | **343** | 271 | 384 | 32.31 | **352** | 319 | 388 | 19.81 | **393** | 305 | 548 | 29.38 |
| ***Number of samples*** | ***9*** | | | | ***11*** | | | | ***14*** | | | | ***25*** | | | | ***17*** | | | | ***252*** | | | |
| Flour Protein, % (12% mb) | **9.7** | 8.8 | 10.2 | 0.50 | **11.7** | 10.9 | 12.4 | 0.69 | **13.2** | 12.4 | 13.8 | 0.48 | **9.8** | 9.1 | 11.5 | 0.49 | **10.2** | 9.7 | 11.4 | 0.49 | **11.8** | 8.2 | 16.6 | 1.53 |
| Ash, % (db) | **0.62** | 0.57 | 0.65 | 0.03 | **0.55** | 0.51 | 0.64 | 0.03 | **0.60** | 0.52 | 0.73 | 0.06 | **0.52** | 0.46 | 0.58 | 0.04 | **0.59** | 0.52 | 0.70 | 0.05 | **0.65** | 0.56 | 0.76 | 0.04 |
| Colour, KJ | **-3.0** | -3.3 | -2.8 | 0.17 | **-3.7** | -4.2 | -3.2 | 0.44 | **-3.3** | -3.6 | -2.9 | 0.23 | **-2.8** | -3.3 | -2.3 | 0.29 | **-2.9** | -3.4 | -1.9 | 0.42 | **-3.5** | -4.0 | -2.3 | 0.31 |
| Minolta CM-5 colour, L* | **93.46** | 93.33 | 93.78 | 0.15 | **93.89** | 93.49 | 94.17 | 0.26 | **93.15** | 92.81 | 93.46 | 0.22 | **93.61** | 92.94 | 93.92 | 0.26 | **93.32** | 92.80 | 93.71 | 0.26 | **93.78** | 92.99 | 94.40 | 0.30 |
| Minolta CM-5 colour, b* | **10.40** | 9.78 | 10.97 | 0.38 | **9.79** | 9.51 | 10.19 | 0.30 | **10.15** | 9.72 | 10.51 | 0.29 | **9.56** | 8.84 | 11.38 | 0.54 | **9.92** | 9.44 | 10.73 | 0.33 | **9.75** | 8.51 | 11.39 | 0.58 |
| Wet gluten, % (14% mb) | **22.6** | 20.2 | 24.0 | 1.51 | **30.8** | 26.9 | 34.4 | 3.24 | **36.4** | 32.3 | 41.3 | 2.57 | **26.4** | 24.5 | 32.3 | 1.62 | **27.8** | 25.9 | 31.9 | 1.77 | **31.9** | 21.3 | 47.7 | 4.55 |
| Dry gluten, % (14% mb) | **8.0** | 6.9 | 8.8 | 0.70 | **10.9** | 9.4 | 12.8 | 1.12 | **13.0** | 11.7 | 15.0 | 0.92 | **9.0** | 8.3 | 10.8 | 0.54 | **9.6** | 8.8 | 10.8 | 0.66 | **11.0** | 7.0 | 16.1 | 1.73 |
| Gluten Index | **99** | 97 | 100 | 1.00 | **97** | 95 | 100 | 2.20 | **95** | 83 | 98 | 5.00 | **95** | 84 | 98 | 2.81 | **95** | 81 | 99 | 4.77 | **95** | 84 | 99 | 3.38 |
| **Farinogram** | | | | | | | | | | | | | | | | | | | | | | | | |
| Water absorption, % (14% mb) | **55.5** | 53.9 | 56.3 | 0.69 | **60.8** | 58.9 | 62.7 | 1.59 | **62.8** | 61.6 | 63.6 | 0.70 | **57.4** | 55.6 | 61.9 | 2.06 | **60.0** | 58.7 | 63.1 | 1.38 | **60.8** | 55.7 | 66.2 | 1.77 |
| Development time, min | **1.8** | 1.5 | 2.3 | 0.26 | **7.9** | 5.9 | 10.5 | 1.38 | **8.0** | 6.7 | 10.4 | 1.23 | **2.2** | 1.8 | 4.5 | 0.60 | **2.7** | 1.7 | 5.8 | 1.19 | **5.8** | 2.5 | 11.8 | 1.84 |
| Stability, min | **8.6** | 2.2 | 15.6 | 5.68 | **15.4** | 10.9 | 18.7 | 3.39 | **13.7** | 10.4 | 18.2 | 3.11 | **6.2** | 3.7 | 11.1 | 1.93 | **8.0** | 4.2 | 12.0 | 2.50 | **8.0** | 4 | 16.5 | 3.03 |
| **Alveogram** | | | | | | | | | | | | | | | | | | | | | | | | |
| Strength, $cm^2$ | **30.4** | 20.2 | 41.4 | 7.07 | **49.3** | 41.0 | 53.4 | 3.40 | **53.0** | 45.9 | 65.3 | 5.46 | **29.5** | 22.6 | 42.0 | 4.41 | **30.5** | 22.8 | 41.4 | 5.24 | **38.3** | 22.2 | 62.5 | 9.15 |
| Stability, mm | **94** | 89 | 98 | 4.10 | **103** | 95 | 111 | 5.50 | **107** | 74 | 134 | 16.30 | **95** | 77 | 126 | 13.62 | **107** | 92 | 129 | 11.03 | **81** | 61 | 112 | 11.29 |
| Distensibility, mm | **57** | 34 | 91 | 18.40 | **100** | 73 | 122 | 15.31 | **103** | 79 | 164 | 25.61 | **61** | 33 | 92 | 17.55 | **52** | 30 | 80 | 12.91 | **114.5** | 60 | 191 | 25.00 |
| P/L | **1.82** | 1.00 | 2.80 | 0.61 | **1.06** | 0.78 | 1.52 | 0.23 | **1.11** | 0.45 | 1.70 | 0.34 | **1.77** | 0.91 | 3.71 | 0.84 | **2.21** | 1.16 | 4.20 | 0.71 | **0.75** | 0.35 | 1.35 | 0.21 |
| **Extensogram** | | | | | | | | | | | | | | | | | | | | | | | | |
| Strength, $cm^2$ | **98** | 85 | 116 | 10.60 | **131** | 110 | 156 | 16.84 | **127** | 104 | 171 | 19.11 | **78** | 66 | 96 | 8.01 | **77** | 69 | 90 | 6.09 | **105** | 54 | 211 | 30.12 |
| Maximum height, BU | **487** | 413 | 595 | 62.68 | **500** | 419 | 597 | 72.15 | **414** | 356 | 521 | 61.31 | **367** | 291 | 446 | 41.04 | **361** | 323 | 409 | 21.58 | **373** | 227 | 541 | 75.54 |
| Extensibility, mm | **148** | 130 | 170 | 11.98 | **192** | 181 | 203 | 6.76 | **227** | 194 | 253 | 17.99 | **153** | 133 | 179 | 11.92 | **151** | 139 | 175 | 9.02 | **198** | 147 | 288 | 28.44 |
| **Mixogram** | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak time, min | **5.1** | 4.2 | 6.7 | 0.95 | **3.5** | 2.6 | 4.3 | 0.76 | **3.0** | 2.7 | 3.3 | 0.21 | **3.3** | 2.7 | 4.5 | 0.46 | **3.4** | 2.8 | 4.0 | 0.36 | **2.6** | 1.9 | 3.7 | 0.40 |
| **100 g Baking test** | | | | | | | | | | | | | | | | | | | | | | | | |
| Volume, $cm^3$ | **845** | 750 | 904 | 57.39 | **991** | 927 | 1039 | 42.01 | **1042** | 935 | 1139 | 51.69 | **848** | 748 | 921 | 41.20 | **832** | 658 | 933 | 87.99 | **1047** | 855 | 1193 | 90.79 |
| Evaluation | **0** | 0 | 0 | 0.00 | **0** | 0 | 0 | 0.00 | **0** | 0 | 1 | 0.27 | **0** | 0 | 1 | 0.20 | **1** | 0 | 5 | 1.78 | **0** | 0 | 4 | 0.49 |
| ***Number of samples*** | ***9*** | | | | ***11*** | | | | ***14*** | | | | ***25*** | | | | ***17*** | | | | ***70*** | | | |

# Table 9: Average quality results of imported wheat during the 2015/2016 season (previous season) (continue)

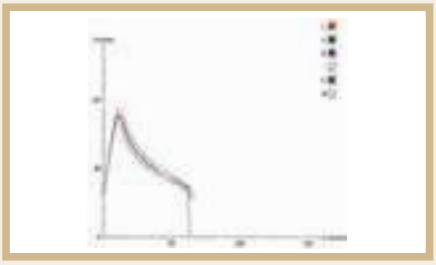
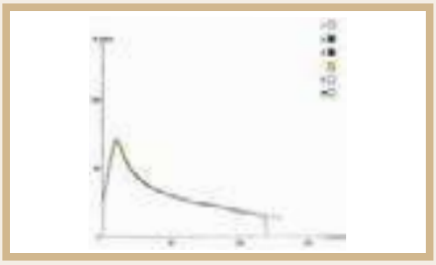
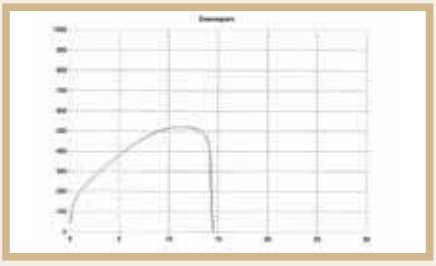
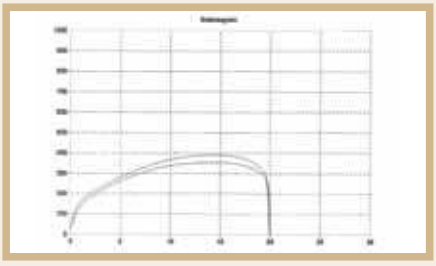
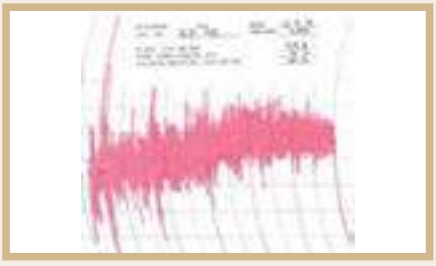
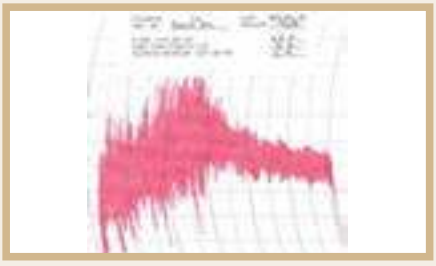
| Quality parameter | Poland | | | | Russian Federation | | | | Ukraine | | | | USA | | | | RSA crop average 2015/2016 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev | Ave | Min | Max | Stdev |
| HIm, kg/hl | **80.7** | 79.1 | 81.9 | 0.93 | **78.2** | 75.2 | 80.7 | 0.95 | **81.6** | 80.9 | 82.0 | 0.50 | **77.7** | 75.7 | 79.4 | 0.99 | **81.1** | 71.2 | 86.2 | 2.07 |
| Screenings, % | **2.71** | 1.82 | 3.70 | 0.61 | **3.34** | 1.45 | 9.80 | 1.45 | **1.93** | 1.32 | 2.93 | 0.67 | **3.41** | 1.89 | 5.56 | 1.06 | **1.71** | 0.10 | 10.28 | 1.04 |
| 1000 kernel mass, g (13% mb) | **42.6** | 40.6 | 44.5 | 1.28 | **36.0** | 31.8 | 39.1 | 1.95 | **38.4** | 36.3 | 39.1 | 1.20 | **31.5** | 26.2 | 37.1 | 2.95 | **36.8** | 22.6 | 50.6 | 3.49 |
| WWF Protein, % (12% mb) | **11.4** | 10.8 | 12.2 | 0.43 | **11.3** | 10.1 | 12.6 | 0.53 | **10.7** | 10.4 | 11.4 | 0.38 | **10.9** | 9.2 | 11.8 | 0.91 | **12.8** | 8.9 | 18.7 | 1.16 |
| WWF Falling number, sec | **358** | 315 | 384 | 20.03 | **395** | 252 | 488 | 51.17 | **271** | 233 | 325 | 36.57 | **312** | 180 | 449 | 74.96 | **393** | 305 | 548 | 29.38 |
| ***Number of samples*** | ***20*** | | | | ***69*** | | | | ***5*** | | | | ***30*** | | | | ***252*** | | | |
| Flour Protein, % (12% mb) | **10.2** | 9.5 | 11.1 | 0.41 | **10.1** | 8.9 | 11.5 | 0.54 | **9.5** | 9.3 | 10.0 | 0.32 | **9.2** | 7.2 | 10.3 | 1.20 | **11.8** | 8.2 | 16.6 | 1.53 |
| Ash, % (db) | **0.53** | 0.48 | 0.69 | 0.06 | **0.58** | 0.50 | 0.66 | 0.03 | **0.51** | 0.50 | 0.52 | 0.01 | **0.55** | 0.44 | 0.63 | 0.05 | **0.65** | 0.56 | 0.76 | 0.04 |
| Colour, KJ | **-3.1** | -3.4 | -2.7 | 0.17 | **-2.7** | -3.1 | -2.2 | 0.22 | **-3.0** | -3.1 | -2.9 | 0.08 | **-2.5** | -2.9 | -1.7 | 0.27 | **-3.5** | -4.0 | -2.3 | 0.31 |
| Minolta CM-5 colour, L* | **93.54** | 93.16 | 93.79 | 0.14 | **93.27** | 92.90 | 93.58 | 0.15 | **93.55** | 93.43 | 93.65 | 0.09 | **93.76** | 93.07 | 94.86 | 0.61 | **93.78** | 92.99 | 94.40 | 0.30 |
| Minolta CM-5 colour, b* | **9.72** | 9.21 | 10.07 | 0.20 | **11.16** | 9.92 | 12.76 | 0.52 | **10.26** | 10.11 | 10.41 | 0.14 | **9.76** | 8.49 | 11.24 | 0.81 | **9.75** | 8.51 | 11.39 | 0.58 |
| Wet gluten, % (14% mb) | **27.7** | 26.2 | 30.2 | 1.14 | **24.7** | 20.2 | 29.3 | 1.86 | **23.4** | 21.5 | 25.8 | 1.90 | **24.0** | 16.8 | 26.3 | 1.88 | **31.9** | 21.3 | 47.7 | 4.55 |
| Dry gluten, % (14% mb) | **9.4** | 8.8 | 10.4 | 0.42 | **8.5** | 7.1 | 11.0 | 0.87 | **8.4** | 7.6 | 9.3 | 0.67 | **8.4** | 5.2 | 9.5 | 0.84 | **11.0** | 7.0 | 16.1 | 1.73 |
| Gluten Index | **95** | 90 | 98 | 2.37 | **97** | 89 | 100 | 2.24 | **100** | 99 | 100 | 0.55 | **98** | 94 | 100 | 1.42 | **95** | 84 | 99 | 3.38 |
| **Farinogram** | | | | | | | | | | | | | | | | | | | | |
| Water absorption, % (14% mb) | **58.5** | 56.2 | 60.5 | 1.30 | **56.4** | 54.1 | 59.8 | 1.23 | **55.7** | 54.8 | 57.6 | 1.17 | **53.4** | 48.0 | 57.3 | 3.34 | **60.8** | 55.7 | 66.2 | 1.77 |
| Development time, min | **2.4** | 1.5 | 3.4 | 0.57 | **2.2** | 1.5 | 7.2 | 0.91 | **2.0** | 1.7 | 2.3 | 0.23 | **1.8** | 0.9 | 2.7 | 0.51 | **5.8** | 2.5 | 11.8 | 1.84 |
| Stability, min | **8.7** | 4.7 | 16.2 | 3.64 | **6.4** | 2.0 | 14.8 | 3.30 | **4.3** | 3.6 | 6.4 | 1.17 | **5.5** | 1.1 | 11.9 | 3.60 | **8.0** | 4 | 16.5 | 3.03 |
| **Alveogram** | | | | | | | | | | | | | | | | | | | | |
| Strength, $cm^2$ | **32.7** | 23.1 | 38.7 | 4.20 | **30.8** | 16.5 | 44.6 | 5.66 | **30.0** | 23.4 | 35.5 | 4.47 | **25.2** | 9.3 | 39.4 | 11.33 | **38.3** | 22.2 | 62.5 | 9.15 |
| Stability, mm | **104** | 81 | 123 | 11.56 | **93** | 74 | 112 | 8.74 | **89** | 78 | 99 | 7.97 | **62** | 27 | 107 | 25.60 | **81** | 61 | 112 | 11.29 |
| Distensibility, mm | **59** | 37 | 86 | 14.92 | **58** | 24 | 105 | 18.72 | **60** | 44 | 72 | 11.32 | **83** | 44 | 133 | 20.73 | **115** | 60 | 191 | 25.00 |
| P/L | **1.90** | 1.01 | 3.27 | 0.63 | **1.82** | 0.74 | 4.08 | 0.75 | **1.53** | 1.08 | 1.98 | 0.34 | **0.83** | 0.28 | 2.43 | 0.53 | **0.75** | 0.35 | 1.35 | 0.21 |
| **Extensogram** | | | | | | | | | | | | | | | | | | | | |
| Strength, $cm^2$ | **83** | 67 | 106 | 10.41 | **95** | 70 | 148 | 15.49 | **92** | 84 | 95 | 5.50 | **89** | 31 | 124 | 31.83 | **105** | 54 | 211 | 30.12 |
| Maximum height, BU | **394** | 324 | 439 | 30.30 | **463** | 364 | 599 | 51.18 | **430** | 384 | 448 | 30.94 | **442** | 175 | 592 | 123.35 | **373** | 227 | 541 | 75.54 |
| Extensibility, mm | **151** | 137 | 178 | 11.99 | **149** | 135 | 192 | 11.85 | **157** | 154 | 161 | 3.32 | **144** | 99 | 180 | 23.32 | **198** | 147 | 288 | 28.44 |
| **Mixogram** | | | | | | | | | | | | | | | | | | | | |
| Peak time, min | **3.6** | 2.8 | 4.4 | 0.39 | **5.0** | 2.9 | 7.1 | 0.95 | **4.8** | 3.5 | 5.9 | 0.87 | **5.0** | 3.6 | 6.1 | 0.57 | **2.6** | 1.9 | 3.7 | 0.40 |
| **100 g Baking test** | | | | | | | | | | | | | | | | | | | | |
| Volume, $cm^3$ | 830 | 620 | 952 | 106.85 | 849 | 685 | 964 | 54.37 | 846 | 820 | 874 | 21.64 | **853** | 723 | 979 | 82.21 | **1047** | 855 | 1193 | 90.79 |
| Evaluation | 1 | 0 | 6 | 2.35 | 0 | 0 | 5 | 0.63 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.00 | 0 | 0 | 4 | 0.49 |
| ***Number of samples*** | ***20*** | | | | ***69*** | | | | ***5*** | | | | ***30*** | | | | ***70*** | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - ARGENTINA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

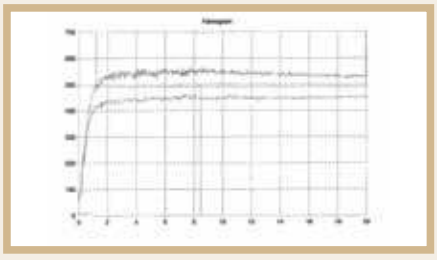
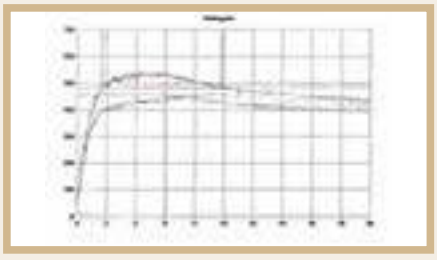
| Country of origin | Argentina Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *3* | *2* | *3* | *-* | *1* | *9* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | - | 11.1 | 10.1 | 11.1 | - | 10.6 | 10.8 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | - | 11.0 | 11.0 | 11.0 | - | 10.0 | 10.9 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | - | 369 | 407 | 360 | - | 249 | 361 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | - | 31.9 | 31.1 | 31.1 | - | 38.3 | 32.1 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | - | 79.6 | 79.8 | 79.2 | - | 80.2 | 79.6 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | - | 2.98 | 2.22 | 3.15 | - | 2.12 | 2.77 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | - | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | - | 0.18 | 0.04 | 0.13 | - | 0.14 | 0.13 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | - | 0.49 | 0.18 | 0.39 | - | 0.62 | 0.40 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | - | 0.14 | 0.00 | 0.08 | - | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | - | 0.11 | 0.02 | 0.04 | - | 0.08 | 0.06 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | - | 0.08 | 0.00 | 0.03 | - | 0.24 | 0.06 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | - | 0.00 | 0.00 | 0.00 | - | 0.24 | 0.03 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | - | 0.00 | 0.00 | 0.01 | - | 0.16 | 0.02 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | - | 0.33 | 0.02 | 0.16 | - | 0.48 | 0.22 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | - | 3.98 | 2.46 | 3.83 | - | 3.36 | 3.52 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | - | 0.27 | 1.16 | 0.48 | - | 0.16 | 0.52 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | - | 0.28 | 0.24 | 0.32 | - | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | - | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | - | 0 | 0 | 0 | - | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | - | No | No | No | - | No | No | No | No | No | No | No | No | No |
| Undesirable odour | - | No | No | No | - | No | No | No | No | No | No | No | No | No |
| | | | | | | | | | | | | | | |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *3* | *2* | *3* | *-* | *1* | *9* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | - | 71.8 | 71.7 | 71.8 | - | 72.4 | 71.9 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ (wet) | - | -3.0 | -3.3 | -3.0 | - | -2.8 | -3.0 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | - | 93.38 | 93.62 | 93.44 | - | 93.44 | 93.46 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | - | 0.48 | 0.50 | 0.46 | - | 0.40 | 0.47 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | - | 10.55 | 10.62 | 10.31 | - | 9.78 | 10.40 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | - | 0.64 | 0.58 | 0.63 | - | 0.59 | 0.62 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | - | 10.1 | 8.9 | 9.8 | - | 9.5 | 9.7 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | - | 23.8 | 20.3 | 23.1 | - | 22.4 | 22.6 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | - | 8.6 | 7.0 | 8.0 | - | 7.9 | 8.0 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | - | 98 | 100 | 99 | - | 100 | 99 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | - | 59.9 | 58.8 | 59.6 | - | 59.3 | 59.5 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | - | 880 | 756 | 873 | - | 839 | 845 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | - | 55.9 | 54.9 | 55.7 | - | 55.2 | 55.5 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | - | 2.0 | 1.6 | 1.9 | - | 1.7 | 1.8 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | - | 12.3 | 2.4 | 10.3 | - | 4.7 | 8.6 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | - | 35 | 67 | 41 | - | 44 | 45 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| | |  | | | | | | |  | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

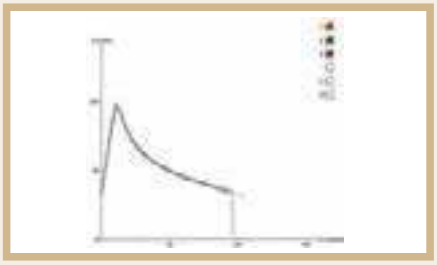
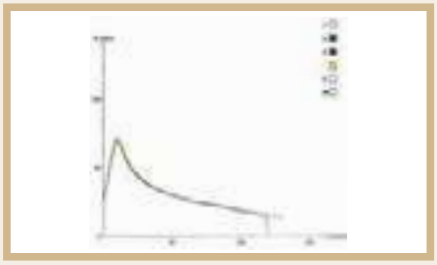
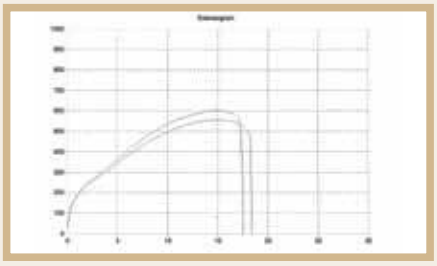
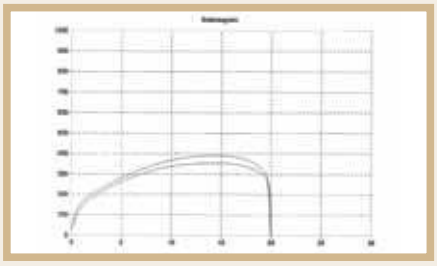
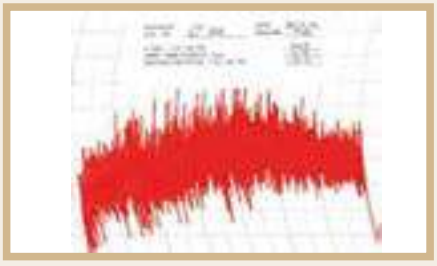
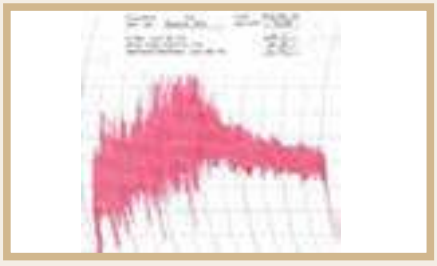
| Country of origin | Argentina Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | - | 3 | 2 | 3 | - | 1 | 9 | 25 | 19 | 9 | 8 | 9 | - | 70 |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | - | 34.7 | 21.4 | 34.5 | - | 23.2 | 30.4 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | - | 96 | 94 | 92 | - | 90 | 94 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | - | 65 | 35 | 69 | - | 41 | 57 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | - | 1.49 | 2.71 | 1.42 | - | 2.20 | 1.82 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | - | 97 | 86 | 110 | - | 93 | 98 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | - | 465 | 453 | 556 | - | 418 | 487 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | - | 155 | 135 | 146 | - | 163 | 148 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | - | 4.5 | 6.7 | 4.8 | - | 5.0 | 5.1 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | - | 59.9 | 58.8 | 59.6 | - | 59.3 | 59.5 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | 179 [423] | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***5*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - AUSTRALIA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

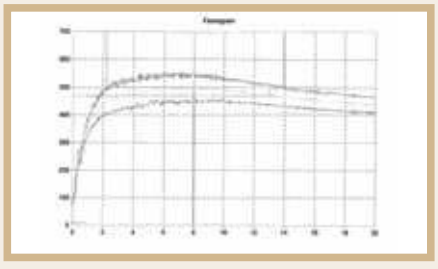
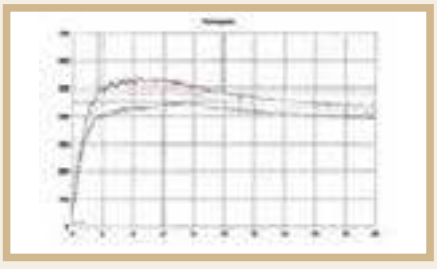
| Country of origin | Australia Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *5* | *5* | *-* | *1* | *-* | *-* | *11* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 13.5 | 12.2 | - | 12.1 | - | - | 12.8 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | 9.9 | 9.4 | - | 8.7 | - | - | 9.6 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | 562 | 443 | - | 415 | - | - | 495 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | 38.5 | 36.5 | - | 34.3 | - | - | 37.2 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | 82.7 | 82.0 | - | 82.8 | - | - | 82.4 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | 2.01 | 2.19 | - | 3.17 | - | - | 2.20 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | 0.10 | 0.20 | - | 0.18 | - | - | 0.15 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | 0.10 | 0.35 | - | 0.32 | - | - | 0.24 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | 2.21 | 2.74 | - | 3.67 | - | - | 2.58 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | No | No | - | No | - | - | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | - | No | - | - | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *5* | *5* | *-* | *1* | *-* | *-* | *11* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | 74.3 | 70.8 | - | 70.1 | - | - | 72.3 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ (wet) | -3.3 | -3.9 | - | -4.1 | - | - | -3.7 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 93.72 | 94.03 | - | 94.06 | - | - | 93.89 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | 0.43 | 0.41 | - | 0.46 | - | - | 0.42 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | 9.54 | 9.96 | - | 10.19 | - | - | 9.79 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | 0.57 | 0.54 | - | 0.51 | - | - | 0.55 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | 12.3 | 11.2 | - | 11.0 | - | - | 11.7 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | 33.8 | 28.3 | - | 27.7 | - | - | 30.8 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | 11.9 | 10.0 | - | 10.0 | - | - | 10.9 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | 95 | 99 | - | 99 | - | - | 97 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 62.6 | 61.1 | - | 60.9 | - | - | 61.8 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | 1023 | 966 | - | 961 | - | - | 991 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 62.1 | 59.8 | - | 58.9 | - | - | 60.8 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | 7.3 | 8.6 | - | 6.9 | - | - | 7.9 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | 12.1 | 18.1 | - | 18.5 | - | - | 15.4 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | 22 | 11 | - | 10 | - | - | 16 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

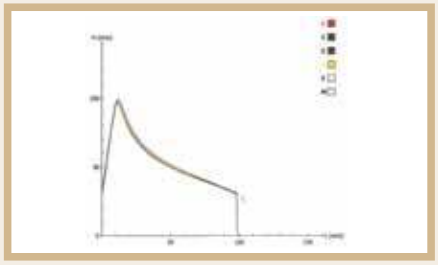
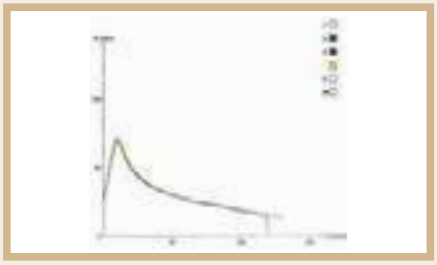
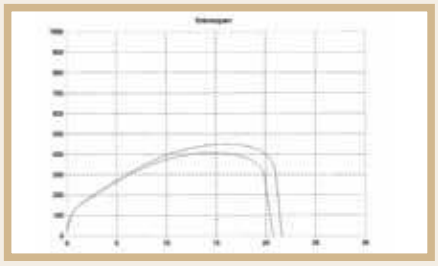
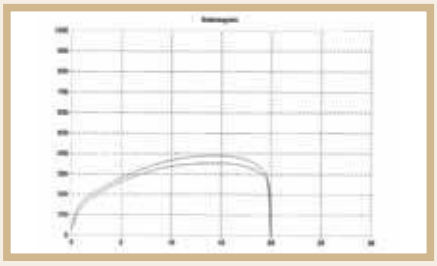
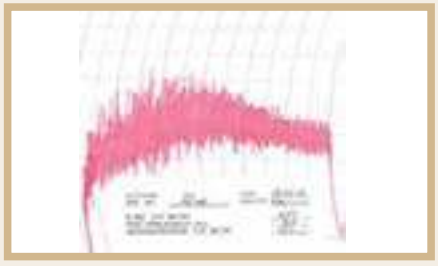
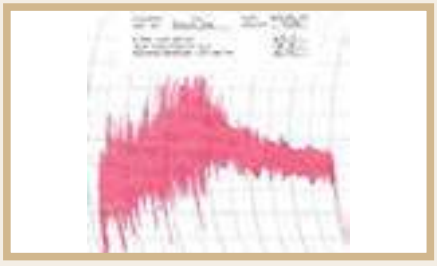
| Country of origin | Australia Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| No. of samples | 5 | 5 | - | 1 | - | - | 11 | 25 | 19 | 9 | 8 | 9 | - | 70 |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 49.5 | 49.1 | - | 48.9 | - | - | 49.3 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | 98 | 108 | - | 103 | - | - | 103 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | 114 | 89 | - | 90 | - | - | 100 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | 0.86 | 1.23 | - | 1.14 | - | - | 1.06 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 118 | 138 | - | 156 | - | - | 131 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | 444 | 537 | - | 597 | - | - | 500 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | 192 | 191 | - | 198 | - | - | 192 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 2.8 | 4.1 | - | 4.3 | - | - | 3.5 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | 62.6 | 61.1 | - | 60.9 | - | - | 61.8 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | ND | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| **No. of samples** | **4** | | | | | | | **40** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - CANADA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

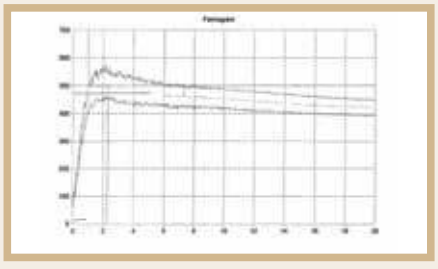
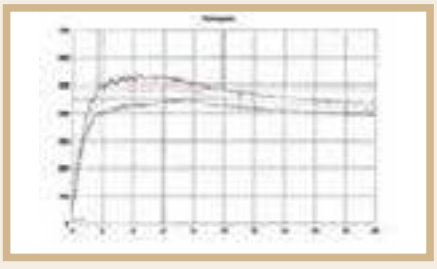
| Country of origin | Canada Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *12* | *1* | *-* | *1* | *-* | *-* | *14* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 14.3 | 11.6 | - | 14.6 | - | - | 14.1 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | 12.2 | 12.1 | - | 12.0 | - | - | 12.2 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | 379 | 362 | - | 399 | - | - | 379 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | 34.2 | 31.1 | - | 31.2 | - | - | 33.8 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | 81.5 | 82.0 | - | 82.2 | - | - | 81.6 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | 2.23 | 2.91 | - | 3.03 | - | - | 2.34 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | 0.15 | 0.15 | - | 0.12 | - | - | 0.15 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | 0.21 | 0.22 | - | 0.17 | - | - | 0.21 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | 0.05 | 0.08 | - | 0.00 | - | - | 0.05 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | 0.29 | 0.00 | - | 0.00 | - | - | 0.25 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | 0.00 | 0.00 | - | 0.00 | - | - | 0.00 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | 0.05 | 0.08 | - | 0.00 | - | - | 0.05 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | 2.64 | 3.36 | - | 3.32 | - | - | 2.74 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | 0.19 | 0.68 | - | 0.76 | - | - | 0.27 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | 0.06 | 0.12 | - | 0.20 | - | - | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.04 | 0.00 | - | 0.24 | - | - | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | No | No | - | No | - | - | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | - | No | - | - | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *12* | *1* | *-* | *1* | *-* | *-* | *14* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | 72.5 | 72.1 | - | 72.3 | - | - | 72.4 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | -3.3 | -3.1 | - | -2.9 | - | - | -3.3 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 93.19 | 92.93 | - | 92.98 | - | - | 93.15 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | 0.56 | 0.63 | - | 0.67 | - | - | 0.57 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | 10.09 | 10.43 | - | 10.51 | - | - | 10.15 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | 0.59 | 0.64 | - | 0.65 | - | - | 0.60 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | 13.2 | 13.2 | - | 13.2 | - | - | 13.2 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | 36.4 | 36.8 | - | 36.9 | - | - | 36.4 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | 13.1 | 13.2 | - | 12.6 | - | - | 13.0 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | 95 | 96 | - | 95 | - | - | 95 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 63.7 | 63.8 | - | 63.8 | - | - | 63.7 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | 1039 | 1033 | - | 1085 | - | - | 1042 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | 0 | 0 | - | 0 | - | - | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 62.8 | 63.2 | - | 62.6 | - | - | 62.8 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | 8.2 | 6.8 | - | 7.2 | - | - | 8.0 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | 14.1 | 11.4 | - | 11.7 | - | - | 13.7 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | 20 | 22 | - | 24 | - | - | 20 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

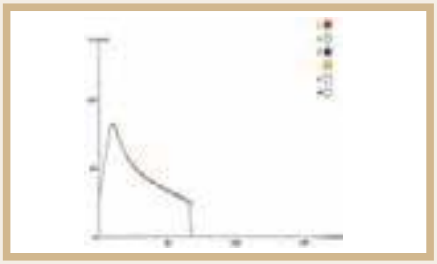
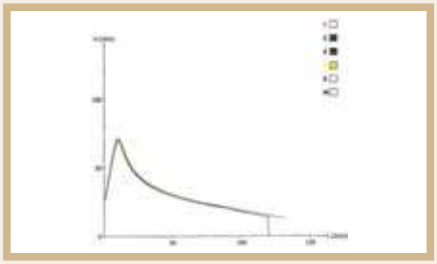
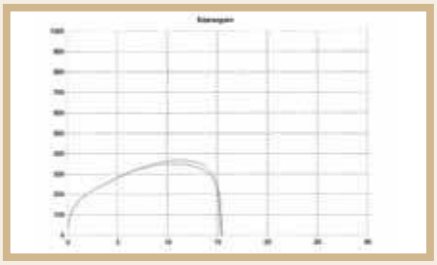
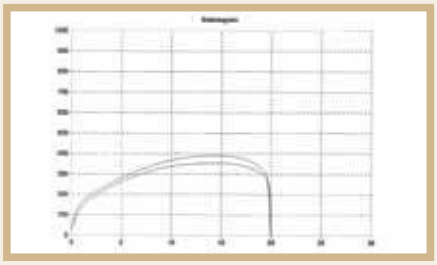
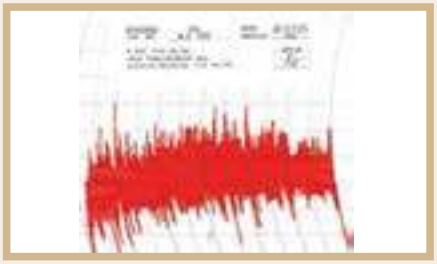
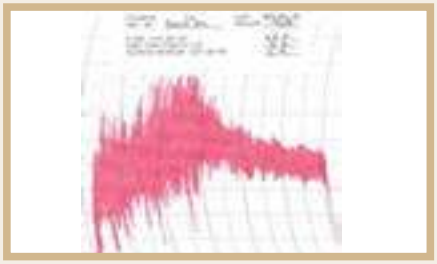
| Country of origin | Canada Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *12* | *1* | *-* | *1* | *-* | *-* | *14* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 53.4 | 48.2 | - | 53.1 | - | - | 53.0 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | 107 | 109 | - | 107 | - | - | 107 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | 105 | 85 | - | 98 | - | - | 103 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | 1.10 | 1.28 | - | 1.09 | - | - | 1.11 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 128 | 124 | - | 110 | - | - | 127 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | 417 | 427 | - | 361 | - | - | 414 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | 228 | 213 | - | 225 | - | - | 227 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 3.0 | 3.1 | - | 3.1 | - | - | 3.0 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | 63.7 | 63.8 | - | 63.8 | - | - | 63.7 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | 146 [257] | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***4*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - GERMANY (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

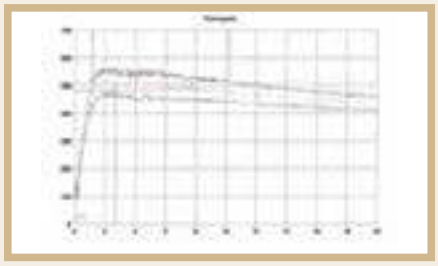
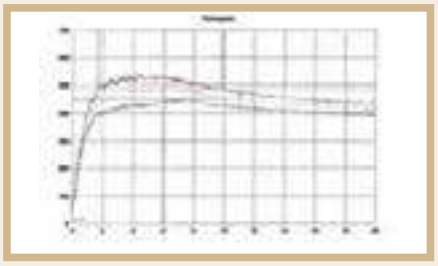
| Country of origin | Germany Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *1* | *11* | *6* | *1* | *4* | *2* | *25* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 13.0 | 11.3 | 10.8 | 11.0 | 11.1 | 10.6 | 11.1 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | 10.2 | 11.7 | 12.0 | 12.4 | 11.6 | 11.8 | 11.7 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | 384 | 342 | 325 | 347 | 352 | 358 | 343 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | 40.7 | 44.2 | 44.8 | 44.0 | 43.9 | 44.9 | 44.2 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | 82.8 | 79.3 | 80.3 | 77.4 | 77.9 | 81.3 | 79.5 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | 2.11 | 2.36 | 2.22 | 3.08 | 3.93 | 2.09 | 2.58 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | 0.08 | 0.17 | 0.09 | 0.31 | 0.14 | 0.03 | 0.14 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | 0.07 | 0.47 | 0.31 | 0.52 | 0.36 | 0.19 | 0.38 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | 0.04 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | 0.00 | 0.04 | 0.00 | 0.08 | 0.03 | 0.00 | 0.02 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | 0.24 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.04 | 0.01 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | 0.04 | 0.06 | 0.05 | 0.08 | 0.03 | 0.06 | 0.05 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | 2.30 | 3.07 | 2.68 | 3.99 | 4.47 | 2.37 | 3.15 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | 0.00 | 0.16 | 0.24 | 0.00 | 0.12 | 0.54 | 0.19 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | 0.00 | 0.00 | 0.16 | 0.16 | 0.18 | 0.64 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | | | | | | | | | | | | | |
| | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| ***No. of samples*** | *1* | *11* | *6* | *1* | *4* | *2* | *25* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | 72.9 | 73.1 | 73.0 | 72.5 | 73.0 | 73.2 | 73.0 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | -3.0 | -2.7 | -2.8 | -3.2 | -3.1 | -3.0 | -2.8 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 92.94 | 93.54 | 93.74 | 93.73 | 93.59 | 93.86 | 93.61 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | 0.61 | 0.46 | 0.48 | 0.46 | 0.49 | 0.50 | 0.48 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | 11.38 | 9.57 | 9.24 | 9.40 | 9.63 | 9.47 | 9.56 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | 0.55 | 0.53 | 0.54 | 0.47 | 0.49 | 0.55 | 0.52 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | 11.5 | 9.9 | 9.4 | 9.7 | 9.8 | 9.3 | 9.8 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | 32.3 | 26.9 | 25.2 | 26.0 | 26.3 | 24.7 | 26.4 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | 10.8 | 9.2 | 8.7 | 8.9 | 8.9 | 8.4 | 9.0 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | 91 | 94 | 96 | 95 | 95 | 97 | 95 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 61.5 | 59.8 | 59.2 | 59.5 | 59.6 | 59.1 | 59.6 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | 921 | 842 | 855 | 870 | 843 | 824 | 848 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 61.9 | 58.3 | 56.6 | 55.9 | 55.8 | 57.1 | 57.4 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | 4.5 | 2.2 | 2.0 | 2.0 | 2.4 | 2.1 | 2.2 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | 10.3 | 6.9 | 5.1 | 6.2 | 5.7 | 4.9 | 6.2 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | 20 | 34 | 41 | 39 | 40 | 42 | 37 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

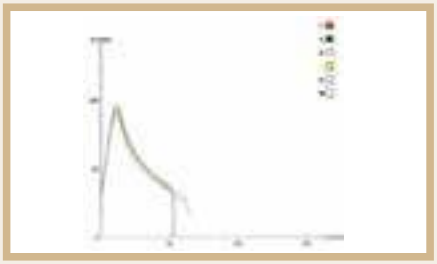
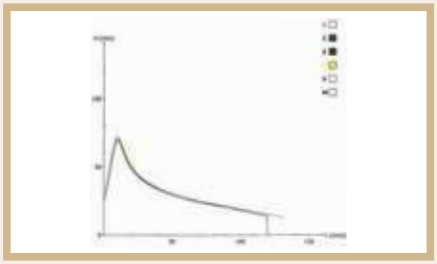
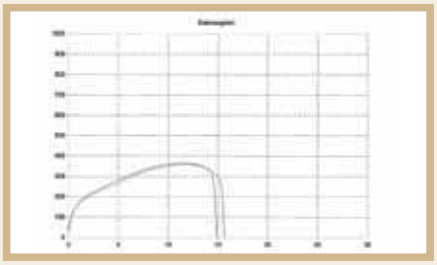
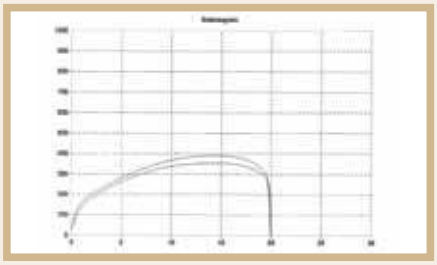
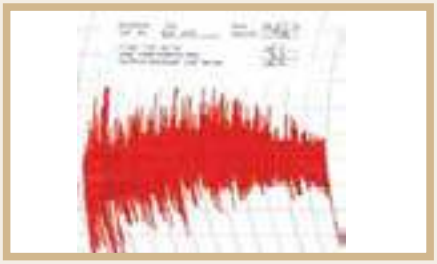
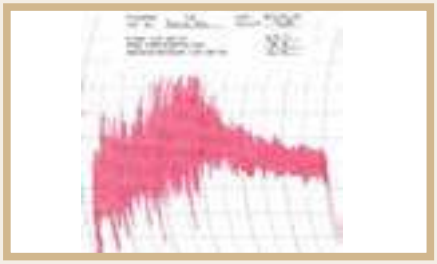
| Country of origin | Germany Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *1* | *11* | *6* | *1* | *4* | *2* | *25* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 39.7 | 30.3 | 27.6 | 31.2 | 30.2 | 24.1 | 29.5 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | 117 | 99 | 92 | 92 | 81 | 103 | 95 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | 62 | 60 | 58 | 66 | 77 | 39 | 61 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | 1.89 | 1.92 | 1.69 | 1.39 | 1.06 | 2.74 | 1.77 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 96 | 79 | 76 | 83 | 80 | 69 | 78 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | 407 | 367 | 347 | 440 | 388 | 330 | 367 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | 173 | 154 | 156 | 136 | 149 | 151 | 153 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 3.2 | 3.2 | 3.1 | 3.6 | 3.9 | 2.9 | 3.3 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | 61.5 | 59.8 | 59.2 | 59.5 | 59.6 | 59.1 | 59.6 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | ND | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***7*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - LITHUANIA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

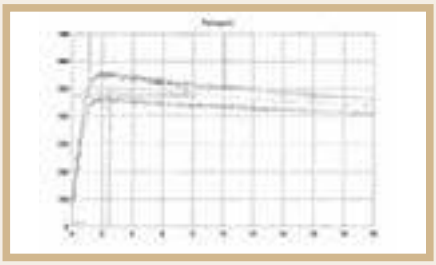
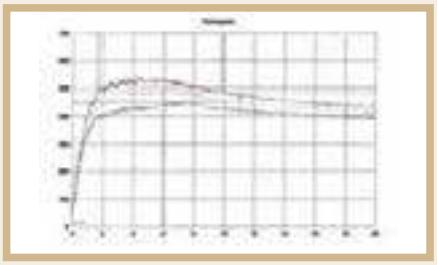
| Country of origin | Lithuania Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *10* | *1* | *4* | *2* | *-* | *17* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | - | 11.2 | 10.7 | 11.4 | 11.8 | - | 11.3 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | - | 11.6 | 11.4 | 12.0 | 11.9 | - | 11.7 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | - | 344 | 383 | 369 | 345 | - | 352 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | - | 42.4 | 42.3 | 42.0 | 43.8 | - | 42.4 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | - | 80.5 | 80.7 | 81.5 | 81.4 | - | 80.8 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | - | 2.63 | 2.36 | 3.36 | 3.51 | - | 2.89 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | - | 0.15 | 0.11 | 0.15 | 0.16 | - | 0.15 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | - | 0.43 | 0.64 | 0.34 | 1.16 | - | 0.50 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | - | 0.01 | 0.00 | 0.03 | 0.06 | - | 0.02 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | - | 0.02 | 0.00 | 0.00 | 0.00 | - | 0.01 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | - | 0.04 | 0.00 | 0.00 | 0.00 | - | 0.03 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | - | 0.08 | 0.00 | 0.03 | 0.06 | - | 0.06 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | - | 3.28 | 3.11 | 3.87 | 4.89 | - | 3.60 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | - | 0.02 | 0.00 | 0.19 | 0.26 | - | 0.09 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | - | 0.06 | 0.00 | 0.06 | 0.16 | - | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | - | No | No | No | No | - | No | No | No | No | No | No | No | No |
| Undesirable odour | - | No | No | No | No | - | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *10* | *1* | *4* | *2* | - | *17* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | - | 73.8 | 73.2 | 72.8 | 73.6 | - | 73.5 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | - | -2.8 | -3.2 | -3.2 | -3.0 | - | -2.9 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | - | 93.32 | 93.67 | 93.31 | 93.19 | - | 93.32 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | - | 0.54 | 0.54 | 0.59 | 0.62 | - | 0.56 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | - | 9.79 | 9.68 | 10.12 | 10.29 | - | 9.92 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | - | 0.60 | 0.55 | 0.57 | 0.62 | - | 0.59 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | - | 10.1 | 9.7 | 10.3 | 10.8 | - | 10.2 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | - | 27.2 | 26.6 | 28.8 | 29.7 | - | 27.8 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | - | 9.4 | 9.3 | 9.9 | 9.9 | - | 9.6 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | - | 96 | 99 | 94 | 88 | - | 95 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | - | 59.9 | 59.3 | 60.2 | 60.7 | - | 60.0 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | - | 812 | 852 | 850 | 889 | - | 832 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | - | 2 | 0 | 0 | 0 | - | 1 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | - | 59.4 | 59.6 | 60.4 | 62.0 | - | 60.0 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | - | 2.4 | 2.2 | 3.2 | 4.0 | - | 2.7 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | - | 7.0 | 9.5 | 9.3 | 9.7 | - | 8.0 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | - | 33 | 16 | 27 | 24 | - | 29 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

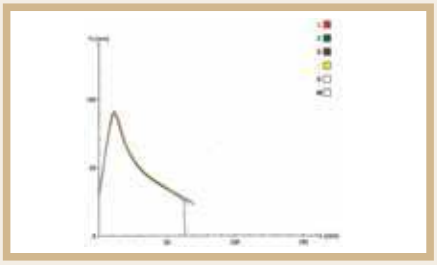
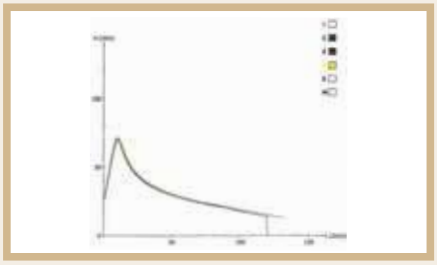
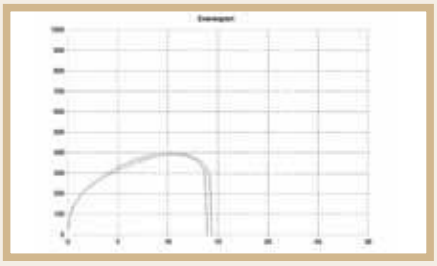
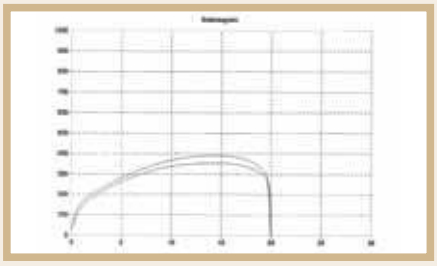
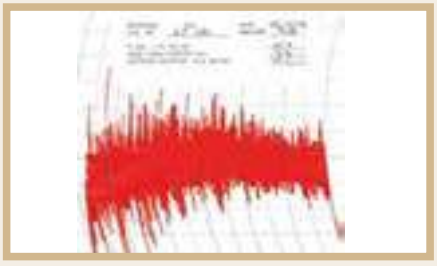
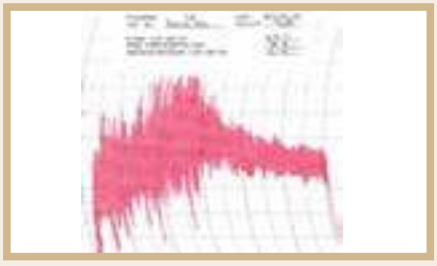
| Country of origin | Lithuania Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | - | *10* | *1* | *4* | *2* | - | *17* | *25* | *19* | *9* | *8* | *9* | - | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | - | 29.7 | 30.4 | 32.7 | 30.3 | - | 30.5 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | - | 103 | 106 | 111 | 124 | - | 107 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | - | 53 | 53 | 55 | 41 | - | 52 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | - | 2.02 | 2.00 | 2.21 | 3.29 | - | 2.21 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | - | 75 | 76 | 82 | 71 | - | 77 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | - | 359 | 367 | 373 | 334 | - | 361 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | - | 149 | 148 | 157 | 150 | - | 151 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | - | 3.5 | 2.9 | 3.3 | 3.2 | - | 3.4 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | - | 59.9 | 59.3 | 60.2 | 60.7 | - | 60.0 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | ND | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) [max. value] | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***6*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - Poland (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

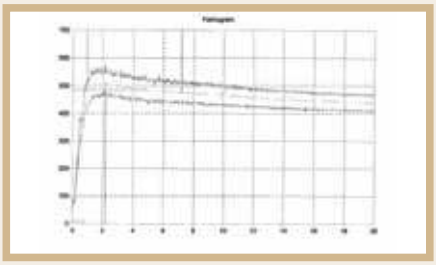
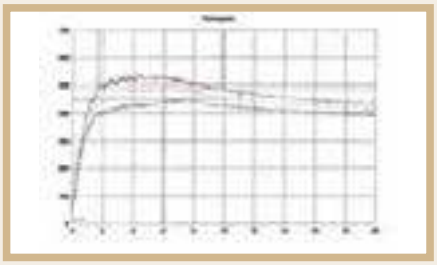
| Country of origin | Poland Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *1* | *8* | *4* | *7* | *-* | *-* | *20* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | 12.2 | 11.6 | 10.9 | 11.3 | - | - | 11.4 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | 11.0 | 11.3 | 11.1 | 11.4 | - | - | 11.3 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | 383 | 349 | 360 | 364 | - | - | 358 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | 41.9 | 43.3 | 42.9 | 41.6 | - | - | 42.6 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | 79.6 | 80.9 | 81.0 | 80.5 | - | - | 80.7 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | 2.32 | 2.27 | 2.56 | 3.36 | - | - | 2.71 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | 0.08 | 0.12 | 0.14 | 0.10 | - | - | 0.11 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | 0.76 | 0.46 | 0.53 | 0.46 | - | - | 0.49 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | 0.00 | 0.00 | 0.06 | 0.12 | - | - | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | 0.00 | 0.02 | 0.05 | 0.07 | - | - | 0.04 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | 0.00 | 0.00 | 0.03 | 0.00 | - | - | 0.01 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | 0.00 | 0.06 | 0.00 | 0.00 | - | - | 0.02 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | 0.00 | 0.08 | 0.14 | 0.19 | - | - | 0.13 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | 3.16 | 2.92 | 3.37 | 4.12 | - | - | 3.44 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | 0.16 | 0.14 | 0.45 | 0.10 | - | - | 0.19 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | 0.00 | 0.07 | 0.08 | 0.02 | - | - | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | No | No | No | No | - | - | No | No | No | No | No | No | No | No |
| Undesirable odour | No | No | No | No | - | - | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *1* | *8* | *4* | *7* | *-* | *-* | *20* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | 71.8 | 73.5 | 72.9 | 72.7 | - | - | 73.0 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | -3.0 | -3.1 | -3.3 | -3.0 | - | - | -3.1 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | 93.79 | 93.53 | 93.64 | 93.45 | - | - | 93.54 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | 0.46 | 0.51 | 0.50 | 0.54 | - | - | 0.52 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | 9.75 | 9.69 | 9.66 | 9.78 | - | - | 9.72 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | 0.55 | 0.51 | 0.51 | 0.57 | - | - | 0.53 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | 10.8 | 10.3 | 9.7 | 10.2 | - | - | 10.2 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | 29.3 | 28.0 | 26.7 | 27.6 | - | - | 27.7 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | 9.8 | 9.5 | 9.1 | 9.4 | - | - | 9.4 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | 98 | 94 | 97 | 96 | - | - | 95 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | 60.7 | 60.2 | 59.5 | 60.1 | - | - | 60.0 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | 943 | 868 | 850 | 760 | - | - | 830 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | 0 | 0 | 0 | 3 | - | - | 1 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | 57.1 | 58.8 | 58.6 | 58.3 | - | - | 58.5 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | 3.4 | 2.6 | 2.1 | 2.4 | - | - | 2.4 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | 15.7 | 9.0 | 6.4 | 8.7 | - | - | 8.7 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | 18 | 29 | 39 | 34 | - | - | 32 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

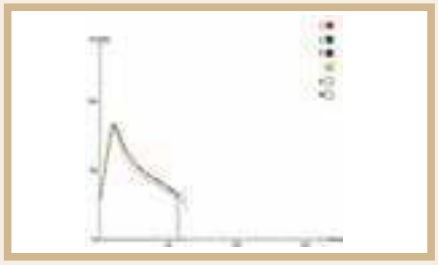
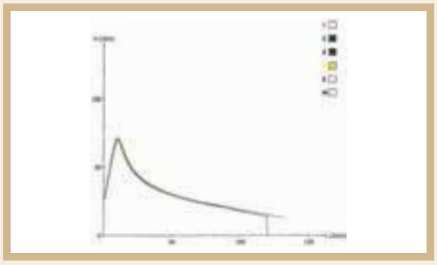
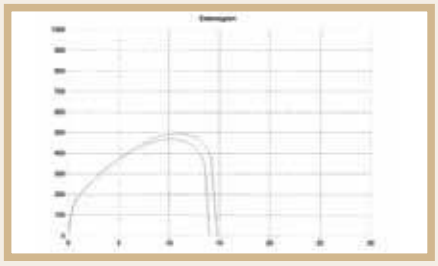
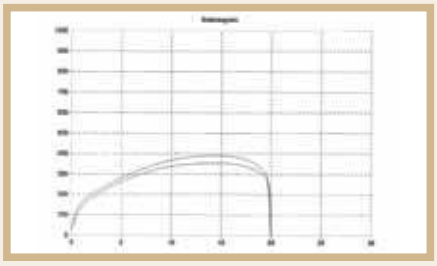
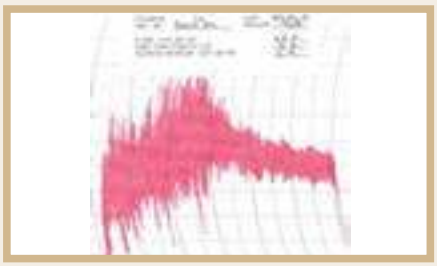
| Country of origin | Poland Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *1* | *8* | *4* | *7* | *-* | *-* | *20* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | 36.5 | 34.6 | 29.7 | 31.5 | - | - | 32.7 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | 96 | 108 | 98 | 104 | - | - | 104 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | 73 | 61 | 59 | 56 | - | - | 59 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | 1.32 | 1.91 | 1.79 | 2.02 | - | - | 1.90 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | 97 | 84 | 75 | 85 | - | - | 83 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | 416 | 402 | 362 | 399 | - | - | 394 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | 168 | 150 | 146 | 153 | - | - | 151 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | 4.0 | 3.4 | 3.4 | 3.8 | - | - | 3.6 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | 60.7 | 60.2 | 59.5 | 60.1 | - | - | 60.0 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | ND | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***6*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - RUSSIA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

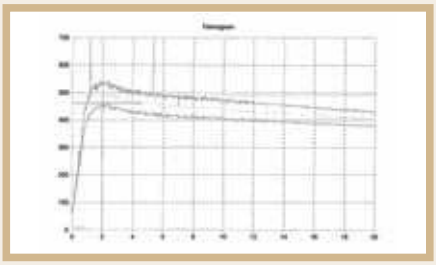
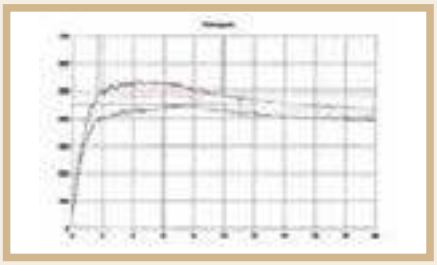
| Country of origin | Russian Federation Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *20* | *7* | *19* | *5* | *18* | *69* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | - | 11.2 | 10.8 | 11.2 | 11.2 | 11.5 | 11.3 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | - | 11.0 | 11.4 | 11.0 | 10.8 | 11.1 | 11.1 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | - | 407 | 401 | 417 | 364 | 365 | 395 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | - | 36.8 | 37.4 | 35.5 | 36.4 | 35.1 | 36.0 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | - | 78.4 | 78.5 | 77.9 | 78.7 | 78.1 | 78.2 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | - | 2.58 | 2.38 | 3.44 | 3.25 | 4.50 | 3.34 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | - | 0.00 | 0.01 | 0.02 | 0.06 | 0.04 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | - | 0.19 | 0.25 | 0.21 | 0.41 | 0.22 | 0.22 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | - | 0.29 | 0.52 | 0.29 | 0.97 | 0.46 | 0.41 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | - | 0.02 | 0.00 | 0.01 | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | - | 0.00 | 0.00 | 0.01 | 0.03 | 0.02 | 0.01 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | - | 0.09 | 0.02 | 0.09 | 0.06 | 0.16 | 0.10 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | - | 0.04 | 0.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | - | 0.04 | 0.02 | 0.03 | 0.03 | 0.01 | 0.03 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | - | 0.15 | 0.03 | 0.14 | 0.15 | 0.18 | 0.15 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | - | 3.21 | 3.18 | 4.07 | 4.77 | 5.37 | 4.12 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | - | 0.29 | 0.05 | 0.21 | 0.10 | 0.11 | 0.18 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | - | 0.08 | 0.09 | 0.08 | 0.08 | 0.13 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | - | 1 | 1 | 2 | 3 | 12 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | - | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Undesirable odour | - | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | | | | | | | | | | | | | |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *20* | *7* | *19* | *5* | *18* | *69* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | - | 72.8 | 72.7 | 72.5 | 71.9 | 72.2 | 72.5 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | - | -2.7 | -2.5 | -2.7 | -2.9 | -2.8 | -2.7 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | - | 93.25 | 93.28 | 93.24 | 93.44 | 93.26 | 93.27 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | - | 0.44 | 0.42 | 0.44 | 0.48 | 0.46 | 0.45 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | - | 11.30 | 11.21 | 11.30 | 11.16 | 10.85 | 11.16 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | - | 0.59 | 0.60 | 0.58 | 0.58 | 0.56 | 0.58 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | - | 10.0 | 9.6 | 10.0 | 10.1 | 10.4 | 10.1 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | - | 25.0 | 23.6 | 24.1 | 24.4 | 25.7 | 24.7 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | - | 8.4 | 8.0 | 8.3 | 8.5 | 9.2 | 8.5 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | - | 95 | 97 | 97 | 97 | 98 | 97 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | - | 59.8 | 59.4 | 59.8 | 60.0 | 60.2 | 59.9 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | - | 836 | 824 | 847 | 863 | 871 | 849 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | - | 57.1 | 56.5 | 56.2 | 57.6 | 55.5 | 56.4 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | - | 2.1 | 1.9 | 2.7 | 2.1 | 2.2 | 2.2 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | - | 5.9 | 4.0 | 6.7 | 5.8 | 7.8 | 6.4 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | - | 39 | 45 | 39 | 42 | 41 | 40 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| | |  | | | | | | |  | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

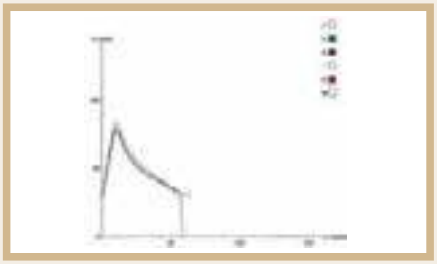
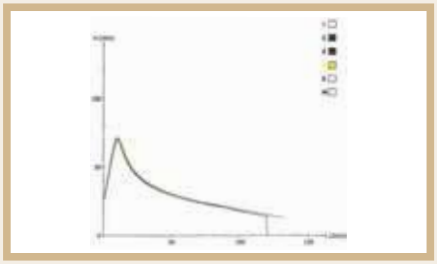
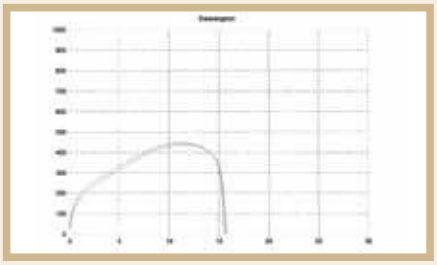
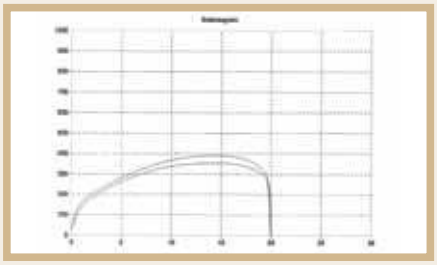
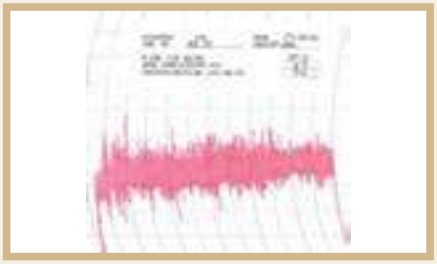
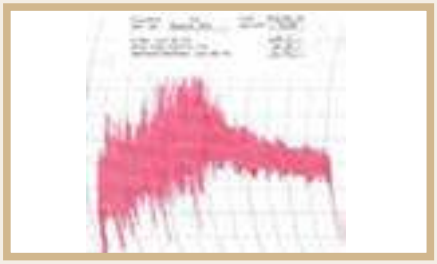
| Country of origin | Russian Federation Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *-* | *20* | *7* | *19* | *5* | *18* | *69* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | - | 29.6 | 28.5 | 30.5 | 31.2 | 33.2 | 30.8 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | - | 97 | 93 | 94 | 97 | 88 | 93 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | - | 52 | 53 | 58 | 59 | 68 | 58 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | - | 1.96 | 1.85 | 1.81 | 2.10 | 1.57 | 1.82 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | - | 89 | 84 | 96 | 93 | 105 | 95 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | - | 450 | 436 | 468 | 440 | 487 | 463 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | - | 146 | 140 | 150 | 152 | 156 | 149 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | - | 4.9 | 4.5 | 5.0 | 5.0 | 5.4 | 5.0 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | - | 59.8 | 59.4 | 59.9 | 60.0 | 60.2 | 59.9 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | <100 [105] | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | 0 [<20] | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***24*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - UKRAINE (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

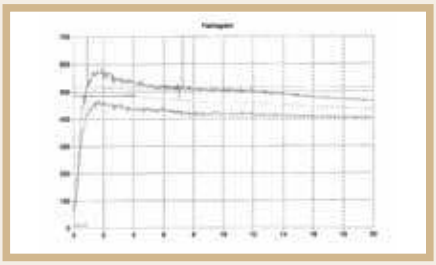
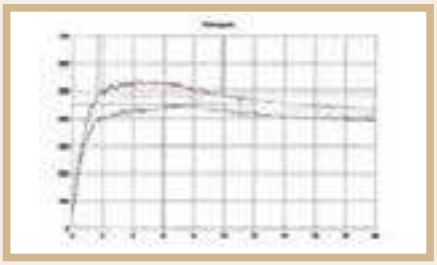
| Country of origin | Ukraine Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *1* | *3* | *-* | *-* | *1* | *5* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | - | 11.4 | 10.6 | - | - | 10.5 | 10.7 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | - | 11.2 | 10.9 | - | - | 10.6 | 10.9 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | - | 325 | 253 | - | - | 273 | 271 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | - | 39.0 | 38.1 | - | - | 39.0 | 38.4 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | - | 81.3 | 81.6 | - | - | 82.0 | 81.6 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | - | 2.93 | 1.81 | - | - | 1.32 | 1.93 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | - | 0.00 | 0.03 | - | - | 0.00 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | - | 0.10 | 0.10 | - | - | 0.06 | 0.09 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | - | 0.15 | 0.18 | - | - | 0.24 | 0.19 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | - | 0.16 | 0.05 | - | - | 0.00 | 0.06 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | - | 0.16 | 0.05 | - | - | 0.00 | 0.06 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | - | 3.34 | 2.14 | - | - | 1.62 | 2.28 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | - | 0.32 | 0.00 | - | - | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | - | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | - | 0 | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | - | 0 | 2 | - | - | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | - | No | No | - | - | No | No | No | No | No | No | No | No | No |
| Undesirable odour | - | No | No | - | - | No | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *1* | *3* | *-* | *-* | *1* | *5* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | - | 72.3 | 72.3 | - | - | 72.4 | 72.3 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | - | -3.1 | -2.9 | - | - | -3.0 | -3.0 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | - | 93.61 | 93.53 | - | - | 93.55 | 93.55 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | - | 0.51 | 0.47 | - | - | 0.45 | 0.47 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | - | 10.41 | 10.24 | - | - | 10.16 | 10.26 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | - | 0.50 | 0.51 | - | - | 0.51 | 0.51 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | - | 10.0 | 9.4 | - | - | 9.3 | 9.5 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | - | 25.8 | 23.2 | - | - | 21.5 | 23.4 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | - | 9.3 | 8.3 | - | - | 7.6 | 8.4 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | - | 99 | 100 | - | - | 100 | 100 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | - | 59.8 | 59.2 | - | - | 59.1 | 59.3 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | - | 874 | 845 | - | - | 820 | 846 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | - | 0 | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | - | 57.6 | 55.4 | - | - | 54.9 | 55.7 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | - | 2.2 | 1.9 | - | - | 2.3 | 2.0 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | - | 6.4 | 3.7 | - | - | 4.2 | 4.3 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | - | 39 | 49 | - | | 46 | 47 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

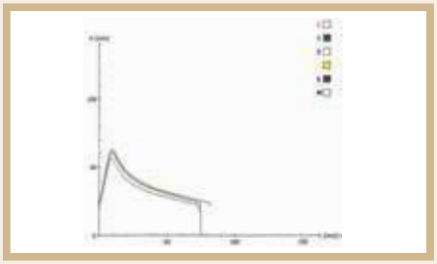
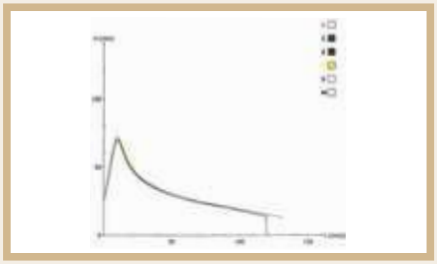
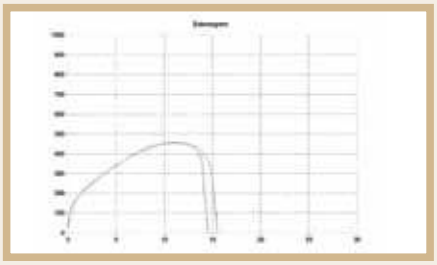
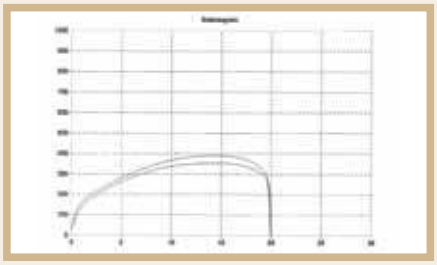
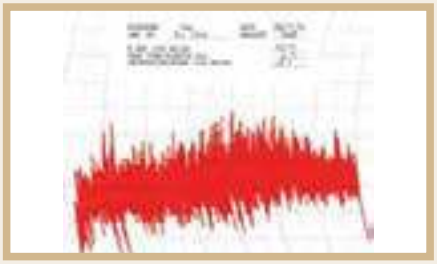
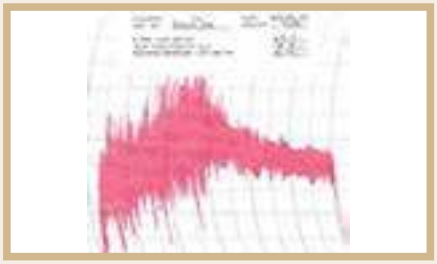
| Country of origin | Ukraine Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | - | 1 | 3 | - | - | 1 | 5 | 25 | 19 | 9 | 8 | 9 | - | 70 |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | - | 32.0 | 31.5 | - | - | 23.4 | 30.0 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | - | 99 | 86 | - | - | 87 | 89 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | - | 58 | 66 | - | - | 44 | 60 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | - | 1.71 | 1.32 | - | - | 1.98 | 1.53 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | - | - | 91 | - | - | 95 | 92 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | - | - | 425 | - | - | 447 | 430 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | - | - | 157 | - | - | 154 | 157 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | - | 3.5 | 5.2 | - | - | 4.7 | 4.8 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | - | 59.8 | 59.2 | - | - | 59.1 | 59.3 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | ND | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) | ND | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***2*** | | | | | | | ***40*** | | | | | | |

# 2015/2016 IMPORTED WHEAT QUALITY - USA (1 Oct 2015 to 30 Sep 2016)

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

| Country of origin | USA Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class and Grade bread wheat** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *4* | *2* | *13* | *10* | *1* | *30* | *124* | *56* | *18* | *11* | *39* | *4* | *252* |
| ***WHEAT*** | | | | | | | | | | | | | | |
| **GRADING** | | | | | | | | | | | | | | |
| Protein (12% mb), % | - | 11.7 | 10.1 | 10.5 | 11.3 | 9.7 | 10.9 | 13.3 | 11.7 | 11.2 | 13.3 | 13.0 | 14.9 | 12.8 |
| Moisture, % | - | 10.7 | 11.6 | 11.2 | 10.7 | 12.0 | 11.0 | 10.3 | 10.8 | 10.9 | 10.6 | 10.6 | 10.4 | 10.5 |
| Falling number, sec | - | 293 | 293 | 319 | 326 | 183 | 312 | 401 | 391 | 367 | 405 | 383 | 375 | 393 |
| 1000 Kernel mass (13% mb), g | - | 30.8 | 33.3 | 33.4 | 28.8 | 31.2 | 31.5 | 36.3 | 39.4 | 39.3 | 34.6 | 34.9 | 30.6 | 36.8 |
| Hlm (dirty), kg/hl | - | 78.1 | 77.3 | 78.0 | 77.4 | 75.8 | 77.7 | 82.3 | 81.6 | 80.2 | 79.3 | 78.6 | 73.8 | 81.1 |
| Screenings (<1.8 mm sieve), % | - | 2.64 | 2.73 | 3.03 | 4.45 | 2.57 | 3.41 | 1.33 | 1.36 | 1.28 | 2.73 | 3.05 | 4.47 | 1.71 |
| Gravel, stones, turf and glass, % | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.20 | 0.01 |
| Foreign matter, % | - | 0.19 | 0.70 | 0.27 | 0.17 | 0.05 | 0.25 | 0.09 | 0.11 | 0.13 | 0.18 | 0.30 | 0.58 | 0.14 |
| Other grain & unthreshed ears, % | - | 0.13 | 0.60 | 0.26 | 0.20 | 0.55 | 0.26 | 0.41 | 0.41 | 0.43 | 0.47 | 1.36 | 2.16 | 0.59 |
| Heat damaged kernels, % | - | 0.00 | 0.10 | 0.03 | 0.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immature kernels, % | - | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.08 | 0.06 | 0.03 | 0.10 | 0.04 | 0.12 | 0.06 |
| Insect damaged kernels, % | - | 0.07 | 0.00 | 0.06 | 0.13 | 0.00 | 0.08 | 0.34 | 0.43 | 0.56 | 0.37 | 0.78 | 2.16 | 0.47 |
| Heavily frost damaged kernels, % | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.01 |
| Sprouted kernels, % | - | 0.07 | 0.16 | 0.21 | 0.42 | 1.92 | 0.31 | 0.02 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 |
| Total damaged kernels, % | - | 0.14 | 0.26 | 0.31 | 0.56 | 1.92 | 0.42 | 0.44 | 0.51 | 0.59 | 0.49 | 0.83 | 2.30 | 0.56 |
| Combined deviations, % | - | 3.10 | 4.29 | 3.87 | 5.39 | 5.09 | 4.34 | 2.26 | 2.38 | 2.43 | 3.87 | 5.54 | 9.51 | 2.99 |
| Field fungi, % | - | 0.08 | 0.94 | 0.29 | 0.62 | 1.00 | 0.44 | 0.09 | 0.09 | 0.12 | 0.28 | 0.06 | 0.06 | 0.10 |
| Storage fungi, % | - | 0.00 | 0.32 | 0.10 | 0.06 | 0.96 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ergot, % | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Poisonous seeds (*Crotalaria spp., etc.*) | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poisonous seeds (*Argemone mexicana, etc.*) | - | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Live insects | - | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Undesirable odour | - | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** | **B1** | **B2** | **B3** | **B4** | **UT** | **COW** | **Average** |
| ***No. of samples*** | *-* | *4* | *2* | *13* | *10* | *1* | *30* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **BÜHLER EXTRACTION, %** | - | 71.8 | 69.9 | 71.1 | 69.8 | 72.1 | 70.7 | 73.7 | 73.8 | 73.2 | 73.0 | 72.4 | - | 73.4 |
| ***FLOUR*** | | | | | | | | | | | | | | |
| Colour, KJ | - | -2.5 | -2.8 | -2.6 | -2.5 | -1.7 | -2.5 | -3.6 | -3.6 | -3.3 | -3.5 | -3.4 | - | -3.5 |
| Colour, Minolta CM5 (dry) | | | | | | | | | | | | | | |
| L* | - | 93.23 | 94.56 | 93.85 | 93.67 | 94.11 | 93.76 | 93.79 | 93.80 | 93.68 | 93.76 | 93.85 | - | 93.78 |
| a* | - | 0.36 | 0.32 | 0.36 | 0.41 | 0.33 | 0.37 | 0.49 | 0.47 | 0.42 | 0.47 | 0.47 | - | 0.47 |
| b* | - | 9.90 | 9.07 | 9.92 | 9.75 | 8.49 | 9.76 | 9.73 | 9.66 | 9.83 | 9.74 | 9.90 | - | 9.75 |
| Ash (db), % | - | 0.56 | 0.54 | 0.55 | 0.55 | 0.49 | 0.55 | 0.63 | 0.65 | 0.66 | 0.64 | 0.67 | - | 0.65 |
| Protein (12% mb), % | - | 10.0 | 8.1 | 9.0 | 9.6 | 7.7 | 9.2 | 12.4 | 11.2 | 10.9 | 11.9 | 12.0 | - | 11.8 |
| Wet Gluten (14% mb), % | - | 24.4 | - | 23.7 | 24.1 | - | 24.0 | 33.8 | 30.1 | 29.3 | 32.2 | 32.4 | - | 31.9 |
| Dry Gluten (14% mb), % | - | 8.4 | - | 8.2 | 8.5 | - | 8.4 | 11.8 | 10.4 | 9.7 | 11.2 | 11.1 | - | 11.0 |
| Gluten Index | - | 99 | - | 98 | 98 | - | 98 | 95 | 95 | 95 | 95 | 94 | - | 95 |
| **100g BAKING TEST** | | | | | | | | | | | | | | |
| Baking water absorption, % | - | 59.8 | 58.2 | 58.6 | 59.5 | 57.9 | 59.0 | 62.5 | 61.1 | 60.7 | 62.1 | 62.3 | - | 61.8 |
| Loaf volume, $cm^3$ | - | 949 | 757 | 815 | 893 | 757 | 853 | 1097 | 1012 | 985 | 1029 | 1060 | - | 1047 |
| Evaluation | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 |
| **FARINOGRAM** | | | | | | | | | | | | | | |
| Water absorption, % | - | 54.8 | 48.6 | 53.2 | 54.0 | 49.7 | 53.4 | 61.4 | 60.8 | 59.6 | 60.6 | 60.5 | - | 60.8 |
| Development time, min | - | 2.0 | 1.2 | 1.7 | 1.9 | 1.0 | 1.8 | 6.2 | 5.3 | 5.7 | 5.8 | 5.9 | - | 5.8 |
| Stability, mm | - | 9.3 | 1.5 | 4.4 | 6.2 | 1.2 | 5.5 | 8.4 | 7.2 | 8.1 | 8.1 | 8.5 | - | 8.0 |
| Mixing tolerance index, BU | - | 32 | 81 | 55 | 53 | 115 | 54 | 37 | 39 | 38 | 39 | 36 | - | 38 |
| |  | | | | | | |  | | | | | | |

## 2015/2016 Imported Wheat Quality Versus 2015/2016 RSA Wheat Quality

| Country of origin | USA Average | | | | | | | RSA Crop Average | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class and Grade bread wheat | B1 | B2 | B3 | B4 | UT | COW | Average | B1 | B2 | B3 | B4 | UT | COW | Average |
| *No. of samples* | *-* | *4* | *2* | *13* | *10* | *1* | *30* | *25* | *19* | *9* | *8* | *9* | *-* | *70* |
| **ALVEOGRAM** | | | | | | | | | | | | | | |
| Strength (S), cm² | - | 34.9 | 12.2 | 21.7 | 30.0 | 10.2 | 25.2 | 41.5 | 35.6 | 33.6 | 39.8 | 38.1 | - | 38.3 |
| Stability (P), mm | - | 62 | 33 | 63 | 69 | 32 | 62 | 83 | 83 | 78 | 78 | 79 | - | 81 |
| Distensibility (L), mm | - | 119 | 87 | 67 | 89 | 79 | 83 | 120 | 104 | 108 | 127 | 117 | - | 115 |
| P/L | - | 0.53 | 0.38 | 1.05 | 0.78 | 0.41 | 0.83 | 0.72 | 0.82 | 0.81 | 0.65 | 0.71 | - | 0.75 |
| |  | | | | | | |  | | | | | | |
| **EXTENSOGRAM** | | | | | | | | | | | | | | |
| Strength, cm² | - | 114 | 49 | 77 | 97 | - | 89 | 114 | 94 | 100 | 111 | 105 | - | 105 |
| Max. height, BU | - | 509 | 311 | 407 | 466 | - | 442 | 395 | 357 | 365 | 367 | 359 | - | 373 |
| Extensibility, mm | - | 169 | 110 | 134 | 148 | - | 144 | 207 | 186 | 187 | 207 | 204 | - | 198 |
| |  | | | | | | |  | | | | | | |
| **MIXOGRAM** | | | | | | | | | | | | | | |
| Peak time, min | - | 5.1 | 5.2 | 4.9 | 5.3 | 4.6 | 5.0 | 2.5 | 2.6 | 2.7 | 2.5 | 2.6 | - | 2.6 |
| Absorption, % | - | 59.8 | 58.2 | 59.0 | 59.5 | 57.9 | 59.2 | 62.8 | 61.2 | 61.0 | 62.4 | 62.3 | - | 62.0 |
| |  | | | | | | |  | | | | | | |
| **MYCOTOXINS** | | | | | | | | | | | | | | |
| Afla $G_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $G_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Afla $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_1$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_2$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Fum $B_3$ (µg/kg) | ND | | | | | | | ND | | | | | | |
| Deoxynivalenol (µg/kg) [max. value] | 445 [1813] | | | | | | | <100 [593] | | | | | | |
| 15-ADON (µg/kg) | ND | | | | | | | ND | | | | | | |
| Ochratoxin A (µg/kg) | ND | | | | | | | ND | | | | | | |
| Zearalenone (µg/kg) [max. value] | 45 [215] | | | | | | | ND | | | | | | |
| HT-2 (µg/kg) | ND | | | | | | | ND | | | | | | |
| T-2 Toxin (µg/kg) | ND | | | | | | | ND | | | | | | |
| ***No. of samples*** | ***9*** | | | | | | | ***40*** | | | | | | |

sanas
South African National Accreditation System

# CERTIFICATE OF ACCREDITATION

*In terms of section 22(2) (b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that –*

## SOUTHERN AFRICAN GRAIN LABORATORY NPC

**Co. Reg. No.: 1997/018518/08**

Facility Accreditation Number: **T0116**

is a South African National Accreditation System accredited Testing laboratory provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying schedule of accreditation Annexure "A", bearing the above accreditation number for

## CHEMICAL AND PHYSICAL ANALYSIS

The facility is accredited in accordance with the recognised International Standard

**ISO/IEC 17025:2005**

The accreditation demonstrates technical competency for a defined scope and the operation of a laboratory quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

**Mr R Josias**
**Chief Executive Officer**
**Effective Date: 01 November 2014**
**Certificate Expires: 31 October 2019**

ANNEXURE A

# SCHEDULE OF ACCREDITATION

Facility Number: **T0116**

**Permanent Address of Laboratory:**

Southern African Grain Laboratory (NPC)
Agri-Hub Office Park - Grain Building
477 Witherite Road
The Willows
Pretoria
0040

**Technical Signatories:**

Ms J Nortje (All Methods)
Ms M Bothma (Chemical, Excl. SOP MC23)
Ms M Hammes (Chemical)
Ms A de Jager (Nutrients & Contaminants)
Ms W Louw (In-house Methods 001, 002, 003, 010 & 026)
Ms D Moleke (Rheological)
Ms I Terblanche (Rheological)
Ms H Meyer (Chemical, Nutrients and Contaminants & Grading)
Ms J Kruger (Chemical, excl. In-house method 012)
Ms P Modiba (Chemical)
Ms M Motlanthe (In-house methods 001, 003 & 026)
Mr B van Der Linde (Grading)
Ms M Ramare (All moisture methods & In-house methods 024)

**Postal Address:**

Postnet Suite # 391
Private Bag X1
The Willows
0041

**Tel:** (012) 807-4019
**Fax:** N/A
**E-mail:** Paulina.Modiba@sagl.co.za

**Nominated Representative:**

Ms PM Modiba

**Issue No.:** 26
**Date of Issue:** 26 January 2017
**Expiry Date:** 31 October 2019

| Material or Products Tested | Type of Tests / Properties Measured, Range of Measurement | Standard Specifications, Techniques / Equipment Used |
|---|---|---|
| **CHEMICAL** | | |
| Ground Barley | Moisture (Oven Method) | Analytical EBC Method 3.2, latest Edition (2 hour; 130˚C) |
| Cereal and cereal products specifically-wheat, rice, (hulled paddy), barley, millet, rye, and oats as grain, semolina and flour | Moisture (Oven Method) | ICC Std No.110/1, Latest Edition (90 min; 130˚C) (2 hour; 130˚C) |
| Flour, semolina, bread, all kind of grains and cereal products and food products (except those that are sugar coated) | Moisture (Oven Method) | AACCI 44-15.02, Latest Edition (1 hour; 130˚C) (72 hour, 103˚C) |

| | | |
|---|---|---|
| All flours, cereal grains, oilseeds and animal feeds | Nitrogen and protein (Combustion method - Dumas) | AACCI 46-30.01, Latest Edition |
| Cereal based food stuff | Dietary fibres (Total) | In-house method 012 |
| Food stuff and feeds | Carbohydrates (by difference) (calculation)<br>Energy value (calculation)<br>Total digestible nutritional value (calculation) | SOP MC 23 |
| Food Stuff and feeds | Determination of Ash | In-house method 011 |
| Wheat Kernels | Moisture (Oven Method) | Government Gazette Wheat Regulation, Latest Edition (72 hour, 103°C) |
| Flours of grains e.g. barley, oats, triticale, maize, rye, sorghum and wheat; oilseeds like soybeans and sunflower, feeds and mixed feeds and foodstuffs | Crude fat (Ether extraction by Soxhlet) | In-house method 024 |
| Meal and flour of wheat, rye, barley, other grains, starch containing and malted products | Falling number | ICC Std 107/1, Latest Edition |
| **NUTRIENTS AND CONTAMINANTS** | | |
| Vitamin fortified food and feed products and fortification mixes grain based | Vitamin A as all trans Retinol (Saponification) (HPLC) | In-house method 001 |
| | Thiamine Mononitrate (HPLC)<br>Riboflavin (HPLC)<br>Nicotinamide (HPLC)<br>Pyridoxine Hydrochloride (HPLC) | In-house method 002 |
| | Folic Acid (HPLC) | In-house method 003 |
| Grain based food and feed products (fortified and unfortified) and fortification mixes | Total Sodium (Na)<br>Total Iron (Fe)<br>Total Zinc (Zn) | In-house method 010 |
| Food and feed | Multi-Mycotoxin:<br>-Aflatoxin $G_1$, $B_1$, $G_2$, $B_2$ and total<br>-Deoxynivalenol (DON), 15-ADON<br>-Fumonisin $B_1$, $B_2$, $B_3$<br>-Ochratoxin A<br>-T2, HT-2<br>- Zearalenone | In-house method 026 |

| | | |
|---|---|---|
| **GRADING** | | |
| Maize | Defective kernels (White maize/ yellow maize) | Government Gazette Maize Regulation, Latest Edition |
| Cereal as grains (Wheat, barley, rye and oats) | Hectolitre mass (Kern222) | ISO 7971-3, Latest edition |
| Wheat | Screenings | Government Gazette Wheat Grading Regulation, Latest Edition |
| **RHEOLOGICAL** | | |
| Wheat flour | Alveograph (Rheological properties) | ICC Std 121, Latest Edition |
| Flours | Farinograph (Rheological properties) | AACCI 54.02, Latest Edition (Rheological behaviour of flour Farinograph: Constant Flour Weight procedure) |
| Hard, soft and durum wheat (flour and whole wheat flour) | Mixograph (Rheological properties) | Industry accepted method 020 (Based on AACCI 54-40.02, Latest Edition Mixograph Method) |

Original Date of Accreditation: 01 November 1999

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Accreditation Manager

# CERTIFICATE
# SERTIFIKAAT

**Southern African Grain Lab**

**REEDS / VOER**

**Ash** **Zn** **Crude Fibre** **Fat** **Starch**

**Moisture** **Nx6_25- Protein** **Dietary Fibre**

THISTLE QA

ALASA

PROFICIENCY TESTING PROGRAMS

# CERTIFICATE OF PARTICIPATION

This certificate is awarded to:

**SOUTHERN AFRICAN GRAIN LABORATORY NPC**

**THE WILLOWS – PRETORIA – SOUTH AFRICA**

for its participation in BIPEA's interlaboratory comparisons for the 2015-2016 annual series.

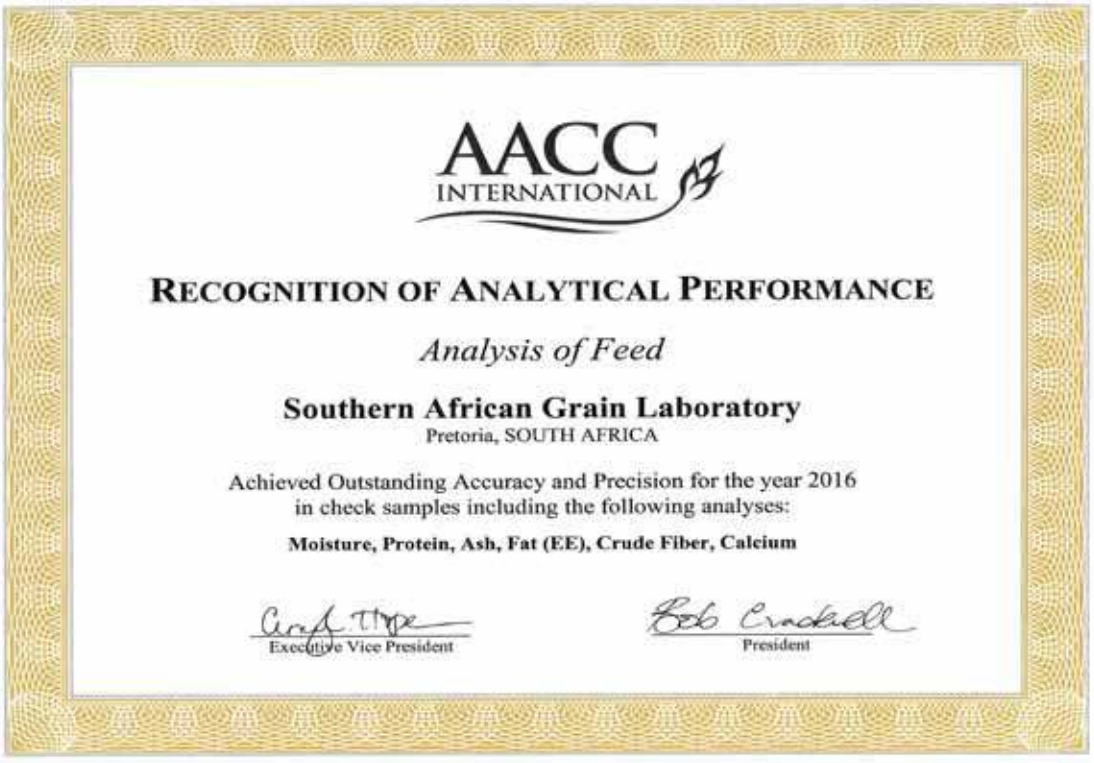
June 30, 2016 - Paris - France

BIPEA Member

BIPEA Director

**Certificate n° 15-16 / 11119**


AACC
INTERNATIONAL
RECOGNITION OF ANALYTICAL PERFORMANCE
Analysis of Hard Wheat Flour
Southern African Grain Laboratory
Pretoria, SOUTH AFRICA
Achieved Outstanding Accuracy and Precision for the year 2016
in check samples including the following analyses:
Moisture, Protein, Ash, Falling Number
Executive Vice President
President


AACC
INTERNATIONAL
RECOGNITION OF ANALYTICAL PERFORMANCE
Analysis of Feed
Southern African Grain Laboratory
Pretoria, SOUTH AFRICA
Achieved Outstanding Accuracy and Precision for the year 2016
in check samples including the following analyses:
Moisture, Protein, Ash, Fat (EE), Crude Fiber, Calcium
Executive Vice President
President

**DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES**

**NO. R. 64** **29 JANUARY 2016**

AGRICULTURAL PRODUCT STANDARDS ACT, 1990
(ACT No.119 OF 1990)

## REGULATIONS RELATING TO THE GRADING, PACKING AND MARKING OF BREAD WHEAT INTENDED FOR SALE IN THE REPUBLIC OF SOUTH AFRICA

The Minister of Agriculture, Forestry and Fisheries, acting under section 15 of the Agricultural Product Standards Act 119 of 1990, has

(a) made the regulations in the Schedule;

(b) determined that the said regulations shall come into operations on the date of publication; and

(c) read together with section 3(1) of the said Act, repealed the Regulations published by Government Notice No. R1186 of December 2010.

### SCHEDULE

***Definitions***

1. Unless the context otherwise indicates, any word or expression in these regulations to which a meaning has been assigned in the Act shall have that meaning, and--

"**animal filth**" means dead rodents, dead birds and dung;

**"bag"** means a bag manufactured from --

(a) jute or phormium or a mixture of jute and phormium; or

(b) polypropylene that complies with SANS specification CKS632 1246:2012;

**"bulk container"** means any vehicle or container in which bulk wheat is stored or transported;

"**consignment**" means --

(a) a quantity of wheat of the same class, which belongs to the same owner, delivered at any one time under cover of the same consignment note, delivery note or receipt note, or delivered by the same vehicle or bulk container, or loaded from the same bin of a grain elevator or from a ship's hold; or

(b) in the case where a quantity referred to in paragraph (a), is subdivided into different grades, each such quantity of each of the different grades.

**"container"** means a bag or bulk container;

"**damaged wheat**" means wheat--

(a) which have been damaged by insects;

(b) which have been distinctly discoloured (orange-brown, dark brown or black) by external heat or as a result of heating caused by internal fermentation in wheat with an excessive moisture content, excluding wheat kernels in respect of which the discolouration is confined to the germ end;

(c) which are immature and have a distinctly green colour; and

(d) in which germination has proceeded to such an extent that the skin covering the embryo has been broken or the developing sprouts and/or rootlets are clearly visible.

"**ergot sclerotia**" means the sclerotia of the fungus *Claviceps purpurea*; and "ergot" has a corresponding meaning;

"**falling number**" means the time in seconds according to Hagberg-Perten as a measure of the degree of Alpha-Amylase activity in grain and flour;

"**field fungi-infected wheat**" means wheat of which the kernels are visibly infected with fungi, and that--

(a) clearly have greyish brush-ends that are discoloured as a whole; or where field fungi growth is present from the brush-ends into the crease; and

(b) have a dull, lifeless, chalky or pinkish and shrunken appearance as a result of *Fusarium* infection.

"**foreign matter**" means all matter excluding wheat, other grain and unthreshed ears. Coal, dung, glass and metal shall not be present in the consignment concerned;

"**heavily frost-damaged wheat**" means --

(a) wheat which have been damaged by severe frost during the milk to soft dough stage and which is characterised by the kernels being fairly plump, but covered entirely with small blisters extending into the crease, excluding --

(i) kernels in which blistering is confined to the back of the kernel; and

(ii) immature wrinkled kernels in which wrinkling has been caused by frost while the kernels were still immature; and

(b) kernels which have a slightly flaked-off bran coat due to frost: Provided that evidence of frost damage is present and that the bran coat had not been rubbed off due to handling.

"**hectolitre mass**" means the mass in kilogram per hectolitre;

"**insect**" means any live grain insect that is injurious to stored grain irrespective of the stage of development of that insect;

"**other grain**" means the kernels or pieces of kernels of barley, oats, triticale, maize, rye and sorghum;

"**poisonous seeds**" means the seeds or bits of seeds of plant species that may in terms of the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972 represent a hazard to human or animal health when consumed, including seeds of *Argemone mexicana, Convolvulus spp.*, *Crotalaria spp., Datura spp., Ipomoea purpurea, Lolium temulentum, Ricinus communis* or *Xanthium spp.*;

"**protein content**" means the percentage protein in wheat on a 12% moisture basis;

"**screenings**" means all material that passes through the standard sieve;

**"standard sieve"** means a slotted sieve --

(a) with a flat bottom of metal sheet of 1,0 mm thickness with apertures 12,7 mm long and 1,8 mm wide with rounded ends. The spacing between the slots in the same row must be 2, 43 mm wide and the spacing between the rows of slots must be 2,0 mm wide. The slots must be alternately orientated with a slot always opposite the solid inter segment of the next row of slots;

(b) of which the upper surface of the sieve is smooth;

(c) with a round frame of suitable material with an inner diameter of between 300 mm and 310 mm maximum and at least 50 mm high; and

(d) that fits onto a tray with a solid bottom and must be at least 20 mm above the bottom of the tray.

"**stinking smut infection**" means wheat that is infected with *Tilletia spp.* with the exception of wheat infected with *Tilletia indica* (karnal bunt). Wheat is considered to be infected by stinking smut infected if one or more of the following characteristics are present--

(a) an unmistakable stinking smut odour; or

(b) wheat kernels that are smeared with stinking smut; or

(c) more than four stinking smut balls (or pieces of balls equal to four stinking smut balls) per 100 g of wheat.

"**storage fungi infected wheat**" means wheat that are visibly infected with fungi, and that show --

(a) blue, green, blackish or yellow fungal growth anywhere on the kernel; or

(b) visible mould beneath the bran.

"**the Act**" means the Agricultural Product Standards Act 119 of 1990;

"**unthreshed ears**" means ears and bits of ears of wheat, barley, triticale and rye that still contain seeds that are completely covered with glumes; and

"**wheat**" means the kernels and pieces of kernels of the species *Triticum aestivum*.

***Restrictions on sale of wheat***

2. (1) No person shall sell a consignment of wheat in the Republic of South Africa --

(a) unless the wheat is sold according to the classes set out in regulation 3;

(b) unless the wheat complies with the standards for the classes set out in regulation 4;

(c) unless the wheat, where applicable, complies with the grades of wheat and the standards for grades set out in regulations 5 and 6 respectively;

(d) unless the wheat is packed in accordance with the packing requirements set out in regulation 7;

(e) unless the containers or sale documents, as the case may be, are marked in accordance with the marking requirements set out in regulation 8; and

(f) if such wheat contains a substance that renders it unfit for human consumption or for processing into or utilisation thereof as food or feed.

(2) The Executive Officer may grant written exemption, entirely or partially, to any person on such conditions as he or she may deem necessary, from the provisions of sub-regulation (1).

**PART I**

**QUALITY STANDARDS**

***Classes of wheat***

3. The classes of wheat are --

(a) Bread Wheat; and

(b) Other Wheat.

***Standards for classes***

4. (1) Notwithstanding the provisions of sub-regulations (2) and (3), a consignment of wheat shall --

(a) be free from any toxin, chemical or any other substance that renders it unsuitable for human consumption or for processing into or utilisation thereof as food or feed and may not exceed the permissible deviations regarding aflatoxin in terms of the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972;

(b) not contain more poisonous seeds or ergot sclerotia than permitted in terms of the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972;

(c) be free from organisms of phytosanitary importance as determined in terms of the Agricultural Pest Act 36 of 1983;

(d) be free from mould infected, sour and rancid other grain and foreign matter;

(e) be free from any undesired odour, taste or colour not typical of undamaged and sound wheat;

(f) be free from animal filth;

(g) be free from stones, glass, metal, coal or dung;

(h) with the exception of Class Other Wheat, be free from grain insects;

(i) with the exception of Class Other Wheat, be free from stinking smut infection; and

(j) with the exception of Class Other Wheat, have a moisture content not exceeding 13 percent**.**

(2) A consignment shall be classified as Bread Wheat if --

(a) the wheat in the consignment consists of at least 95 percent (m/m) of one or more of the bread wheat seeds; and

(b) it complies with the standards for Grade 1, Grade 2, Grade 3, Grade 4 or Utility Grade set out in regulation 6.

(3) A consignment of wheat shall be classified as Class Other Wheat if it does not comply with the standards for Bread Wheat.

***Grades of wheat***

5. (1) The grades for Bread Wheat shall be as follows:

(a) Grade 1.

(b) Grade 2.

(c) Grade 3.

(d) Grade 4; and

(e) Utility grade.

(2) No grades are determined for Class Other Wheat.

***Standards for grades of wheat***

6. (1) Subject to the provisions of subregulations (2), (3) and (4), a consignment of wheat shall be graded as --

(a) Grade 1 if the nature of deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 2 of the said table opposite the deviation concerned;

(b) Grade 2 if the nature of deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 3 of the said table opposite the deviation concerned;

(c) Grade 3 if the nature of deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 4 of the said table opposite the deviation concerned;

(d) Grade 4 if the nature of deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 5 of the said table opposite the deviation concerned; and

(e) Utility Grade if the nature of deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 6 of the said table opposite the deviation concerned.

(2) The minimum hectolitre masses for the different grades are as follows:

(a) Grade 1 - 77 kg.

(b) Grade 2 - 76 kg.

(c) Grade 3 - 74 kg.

(d) Grade 4 - 72 kg; and

(e) Utility Grade - 70 kg.

(3) (a) Grade 1, Grade 2 and Grade 3 shall have a minimum falling number value of not less than 250 seconds.

(b) Grade 4 shall have a minimum falling number value of not less than 200 seconds.

(c) Utility Grade shall have a minimum falling number value of not less than 150 seconds.

(d) Notwithstanding the provision of paragraph (a), wheat shall be deemed to comply with the requirements of the paragraph concerned if it deviates with not more than 30 seconds lower than the minimum prescribed for Grade 1, Grade 2 and Grade 3, as the case may be.

(4) The minimum protein content (on a 12 percent moisture basis) for the different grades shall be as follows:

(a) Grade 1 - 12 percent.

(b) Grade 2 - 11 percent.

(c) Grade 3 - 10 percent.

(d) Grade 4 - 9 percent; and

(e) Utility Grade - 8 percent.

## PART II

## PACKING AND MARKING REQUIREMENTS

***Packing requirements***

7. Wheat of different grades shall be packed in different containers, or stored separately.

***Marking requirements***

8. (1) Every container or the accompanying sale documents of a consignment of wheat shall be marked or endorsed by means of appropriate symbols specified in sub-regulation (2), with --

(a) the class of the wheat; and

(b) the grade.

(2) The symbols referred to in sub-regulation (1) shall appear in the order of class and grade.

(3) The symbols used to indicate the different --

(a) classes shall be --
(i) B in the case of Bread Wheat; and

(ii) O in the case of Other Wheat.

(b) grades shall be --

(i) 1 in the case of Grade 1;

(ii) 2 in the case of Grade 2;

(iii) 3 in the case of Grade 3;

(iv) 4 in the case of Grade 4; and

(v) UT in the case of Utility Grade.

**PART III**

**SAMPLING**

***Taking of sample***

9. (1) A sample of a consignment of wheat shall --

(a) in the case of wheat delivered in bags and subject to regulation 10, be obtained by sampling at least ten percent of the bags, chosen from that consignment at random, with a bag probe: Provided that at least 25 bags in a consignment shall be sampled and where a consignment consists of less than 25 bags, all the bags in that consignment shall be sampled; and

(b) in the case of wheat delivered in bulk and subject to regulation 10, be obtained by sampling that consignment throughout the whole depth of the layer, in at least six different places, chosen at random in that bulk quantity, with a bulk sampling apparatus.

(2) The collective sample obtained in sub-regulation (1) (a) or (b) shall --

(a) have a total mass of at least 10 kg; and

(b) be thoroughly mixed by means of dividing before further examination.

(3) If it is suspected that the sample referred to in sub-regulation (1)(a) is not representative of that consignment, an additional five percent of the remaining bags, chosen from that consignment at random, shall be emptied into a suitable bulk container and sampled in the manner contemplated in sub-regulation (1) (b).

(4) If it is suspected that the sample referred to in sub-regulation (1)(b) is not representative of that consignment, an additional representative sample shall be obtained by using an alternative sampling pattern, apparatus or method.

(5) A sample taken in terms of these regulations shall be deemed to be representative of the consignment from which it was taken.

***Sampling if contents differ***

10. (1) If, after an examination of the wheat taken from different bags in a consignment in terms of regulation 9(1) (a), it appears that the contents of those bags differ substantially --

(a) the bags concerned shall be placed separately;

(b) all the bags in the consignment concerned shall be sampled with a bag probe in order to do such separation; and

(c) each group of bags with similar contents in that consignment shall for the purposes of these regulations be deemed to be a separate consignment.

(2) If, after the discharge of a consignment of wheat in bulk has commenced, it is suspected that the consignment could be of a class or grade other than that determined by means of the initial sampling, the discharge shall immediately be stopped and the part of the consignment remaining in the bulk container as well as the wheat already in the hopper shall be sampled anew with a bulk sampling apparatus or by catching at least 20 samples, by means of a suitable container, at regular intervals throughout the whole offloading period from the stream of wheat flowing in bulk.

***Working sample***

11. A working sample is obtained by dividing the representative sample of the consignment according to the latest revision of the ICC (International Association for Cereal Science and Technology) 101/1 method.

**PART IV**

**DETERMINATION OF OTHER SUBSTANCES**

***Determination of undesirable odours and harmful substances***

12. A consignment of wheat or a sample of a consignment of wheat shall be sensorially assessed or chemically analysed in order to determine whether--

(a) it contains a substance that renders the wheat unfit for human consumption or for processing into or for utilisation as food or feed such as poisonous seeds, stones, glass, metal, coal or dung; and

(b) it has a musty, sour, rancid or other undesirable odour: Provided that a working sample of unscreened wheat that is ground in a grain mill to a fine meal may be used for the determination concerned.

**PART V**

**DETERMINATION OF CLASS, HECTOLITRE MASS, MOISTURE CONTENT, PROTEIN CONTENT AND FALLING NUMBER**

***Determination of class***

13. The class of a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 500 g and screen the working sample in the manner prescribed in regulation 18.

(b) Take at least 100 g of the screened wheat and remove all other grain, un threshed ears and foreign matter by hand.

(c) Obtain a working sample of at least 25 g each after all other grain, unthreshed ears and foreign matter have been removed and separate the different cultivars.

(d) Determine the combined mass of all of the cultivars that belong to the same class and express the mass thus determined as a percentage of the mass of the working sample.

(e) Such percentage represents the percentage of all the cultivars that belong to the same class in the consignment.

***Determination of the hectolitre mass***

14. The hectolitre mass of a consignment of unscreened wheat may be determined by any suitable instrument: Provided that the instrument complies with and has been calibrated to the specifications detailed in ISO (International Organization for Standardization) 7971-3.

***Determination of moisture content***

15. The moisture content of a consignment wheat may be determined by any suitable method: Provided that the results thus obtained is in accordance with the maximum permissible deviation for a class 1 moisture meter as detailed in ISO (International Organization for Standardization) 7700/1 based on the results of the 72 hour, 103°C oven dried method [the latest revision of the AACCI (American Association of Cereal Chemists International) Method 44-15A].

***Determination of protein content***

16. The percentage of protein of a consignment of wheat may be determined according to any suitable method: Provided that --

(a) the determination shall be conducted on a sample which had been sifted using a screen with the same apertures as the standard sieve and from which other grain, un threshed ears and foreign matter had been removed by hand; and

(b) the results thus obtained are in accordance (± 0,3 percent ) with the results obtained by the Dumas Combustion Analysis Method [the latest revision of the AACCI (American Association of Cereal Chemists International) Method 46-30].

***Determination of falling number in wheat***

17. (1) The falling number of a consignment of wheat may be determined according to any suitable method: Provided that --

(a) the determination shall be conducted on a sample which had been sifted using a screen with the same apertures as the standard sieve and from which other grain, unthreshed ears and foreign matter had been removed by hand; and

(b) the results thus obtained are in accordance (± 5 percent) with the results obtained by the latest revision of the ICC (International Association for Cereal Science and Technology) 107/1 method.

(2) If the falling number of a consignment of wheat is determined according to the latest revision of the ICC (International Association for Cereal Science and Technology) 107/1 method --

(a) the sampling in the mentioned method shall be replaced with the manner prescribed in regulation 9; and

(b) only the altitude corrected value shall be used.

**PART VI**

**DETERMINATION OF PERCENTAGE DEVIATIONS**

***Determination of percentage screenings***

18. (1) The percentage screenings in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 500 g.

(b) Place the sample on the standard sieve and screen the sample by moving the sieve 50 strokes to and fro, alternately away from and towards the operator of the sieve, in the same direction as the long axes of the slots of the sieve. Move the sieve, which rests on a table or other suitable smooth surface, 250 mm to 460 mm away from and towards the operator with each stroke. The prescribed 50 strokes must be completed within 50 to 60 seconds: Provided that the screening process may also be performed with the standard sieve in some or other container or an automatic sieving apparatus.

(c) Determine the mass of the material that has passed through the sieve and express it as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage screenings in the consignment.

***Determination of the percentage heavily frost-damaged wheat***

19. The percentage heavily frost-damaged wheat in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 25 g of a screened sample.

(b) Remove all heavily frost-damaged kernels by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage heavily frost-damaged wheat in the consignment concerned.

***Determination of the percentages other grain and unthreshed ears***

20. The percentage other grain and unthreshed ears in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 50 g from a screened sample.

(b) Remove all other grain and unthreshed ears by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage other grain and unthreshed ears in the consignment concerned.

***Determination of the percentage foreign matter***

21. The percentage foreign matter in a consignment of wheat is determined as follows:

(a) Obtain a working sample of at least 100 g from a screened sample.

(b) Remove all foreign matter by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage foreign matter in the consignment concerned.

***Determination of the percentage damaged wheat***

22. The percentage damaged wheat in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 25 g of a screened sample.

(b) Remove all damaged kernels by hand and determines the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage damaged wheat in the consignment concerned.

***Determination of the percentage heat-damaged wheat***

23. The percentage heat-damaged wheat in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 100 g from a screened sample.

(b) Remove all heat-damaged kernels by hand and determine the mass thereof. Kernels from an additional working sample may also be sensorially assessed (by smelling and tasting the kernels) to confirm suspicion of heat damage.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage heat-damaged wheat in the consignment concerned.

***Determination of percentage field fungi infected wheat***

24. The percentage field fungi infected wheat in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 25 g from a screened sample.

(b) Remove all field fungi infected kernels by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage of field fungi infected wheat in the consignment concerned.

***Determination of percentage storage fungi infected wheat***

25. The percentage storage fungi infected wheat in a consignment of wheat shall be determined as follows:

(a) Obtain a working sample of at least 100 g from a screened sample.

(b) Remove all storage fungi infected kernels by hand and determine the mass thereof.

(c) Express the mass thus obtained as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage storage fungi infected wheat in the consignment concerned.

**PART VII**

***Offence and penalties***

26. Any person who contravenes or fails to comply with any provision of these regulations shall be guilty of an offence and upon conviction be liable to a fine of not exceeding R50 000 or to imprisonment for a period not exceeding two years, or to both that fine or imprisonment.

**ANNEXURE**

**TABLE 1**

**STANDARDS FOR GRADES OF BREAD WHEAT**

| Nature of deviation | Maximum percentage permissible deviation (m/m) | | | | |
|---|---|---|---|---|---|
| | **Grade 1** | **Grade 2** | **Grade 3** | **Grade 4** | **Utility Grade** |
| **1** | **3** | **4** | **5** | **6** | **7** |
| (a) Heavily frost-damaged kernel | 5 | 5 | 5 | 5 | 10 |
| (b) Field fungi infected kernels | 2 | 2 | 2 | 2 | 2 |
| (c) Storage fungi infected kernels | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 |
| (d) Screenings | 3 | 3 | 3 | 4 | 10 |
| (e) Other grain and unthreshed ears | 1 | 1 | 1 | 1 | 4 |
| (f) Gravel, stones and turf. | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 |
| (g) Foreign matter including gravel, stones and turf: Provided that such deviations are individually within the limits specified in item (f). | 1 | 1 | 1 | 1 | 3 |
| (h) Heat-damaged kernels | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 |
| (i) Damaged kernels, including heat-damaged kernels: Provided that such deviations are individually within the limit specified in item (h) and provided further that the minimum falling number value prescribed in regulation 6(3) for the grade concerned is at least complied with. | 2 | 2 | 2 | 2 | 5 |
| (j) Deviations in items (d), (e), (g) and (i) collectively: Provided that such deviations are individually within the limits of the said items. | 5 | 5 | 5 | 5 | 10 |

**DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES**

**NO. 1218** **07 OCTOBER 2016**

AGRICULTURAL PRODUCT STANDARDS ACT, 1990

(ACT No. 119 OF 1990)

**AMENDMENT: REGULATIONS REGARDING THE GRADING, PACKING AND MARKING OF BREAD WHEAT INTENDED FOR SALE IN THE REPUBLIC OF SOUTH AFRICA**

The Minister of Agriculture, Forestry and Fisheries, under section 15 of the Agricultural Product Standards Act, 1990 (Act No. 119 of 1990)--

(a) made the regulations in the Schedule; and

(b) determined that the said regulations shall come into operation on the date of publication thereof.

**SCHEDULE**

In this Schedule "the Regulations" means the regulations published by Government Gazette No. 39627, Notice No R 64 of 29 January 2016.

**1. Amendment of regulation 4 of the Regulations**

Regulation 4 of the Regulations is hereby amended by the substitution for paragraph (g) of subregulation (1) of the following paragraph:

"(g) ...be free from glass, metal, coal or dung"