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# **SOUTH AFRICAN COMMERCIAL WHEAT QUALITY 2003/2004 CROP**

## **Acknowledgements**

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## **Introduction**

South Africa's wheat production 5-year average is 2,03 million tons per year.

This year the Western Cape produced the most wheat, namely 938 350 tons, and the Free State followed with 756 000 tons. These two provinces accounted for 73 % of the total wheat production.

This crop includes wheat from the Summer rainfall areas (40 %), Winter rainfall areas (40 %) and Irrigation areas (20 %). This production is not enough for inland requirements, and South Africa has to import wheat to meet domestic consumption of approximately 2,5 million tons this year.

South Africa has three wheat breeding programmes with stringent quality evaluation procedures to continuously better commercial cultivars. Grading standards are also set high to ensure adequate quality control.

The crop quality is determined annually by the Southern African Grain Laboratory (SAGL), which is an association incorporated under section 21 (not for gain) and also the official grain quality reference laboratory in Southern Africa.

## **Crop quality**

The final production estimate was 2,3 million tons with an estimated yield of 2,47 tons per hectare (National Crop Estimates Committee - NCEC).

The quality of this crop was very good as a result of excellent weather conditions in the Western Cape and fair to good weather conditions in the rest of South Africa.

Each year representative wheat crop quality samples are taken by the wheat storers and millers and sent to the SAGL for the annual crop quality survey.

The samples are graded fully and the thousand kernel mass is done. Small samples are milled on the Quadromat mill, after which a mixograph analysis is done.

Composite samples are made up per subclass per region and milled on the Bühler mill. A Farinograph, Extensograph, Alveograph and Baking test are then performed.

Cultivar identification is done on these samples and figures of seed sold by the Grain Silo Owners are also gathered.

# QUALITY ASSESSMENT

## Physical grain quality

Full grading was done and the physical grain quality was very good because of good weather conditions during this season.

The hectolitre mass averaged 78,6 kg/hl (77,1 kg/hl last season). The average thousand kernel weight was 35,4 g (13 % mb). The Irrigation areas gave an average thousand kernel weight of 39,9 g while the Free State area gave the lowest average thousand kernel weight of 34,2 g.

The protein average was 11,6 % (12 % mb) with all the regions giving averages between 11,2 % and 12,0 %.

No falling number problems were experienced and no other abnormalities in the other grading factors.

The average milling extraction in the laboratory on the Bühler MLU 202 was 77,1 %. The Western Cape gave an average extraction of 76,3 % and the Free State 76,1 %. Higher average extractions were obtained from the Irrigation wheat (78,2 %) and other Summer rainfall areas (78,5 %). (Please note that the Bühler laboratory mill usually gives 2 % less extraction than can be obtained commercially.)

The average screenings through a 1,786 mm screen were 1,35 % with the highest average percentage of 1,50 in the Western Cape and the lowest average percentage of 1,20 in the Free State.

## Dough quality

The dough properties are typical of South African wheat.

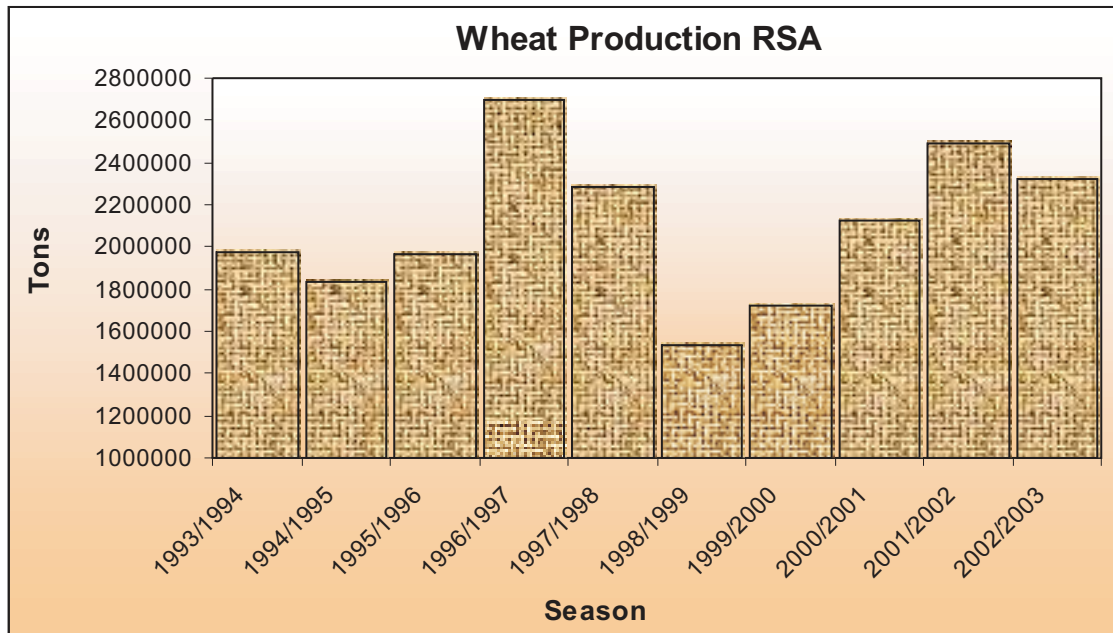
The flour colour averaged -0,3 KJ units with the flour of the Irrigation wheat giving the brightest average colour of -0,9 KJ units.

The mixogram peak time averaged 2,9 minutes with the wheat from the Free State having the longest peak times averaging 3,4 minutes and the wheat from the Irrigation areas averaging 2,1 minutes. This average mixogram peak time (2,9 minutes) is more or less in line with the expected peak time.

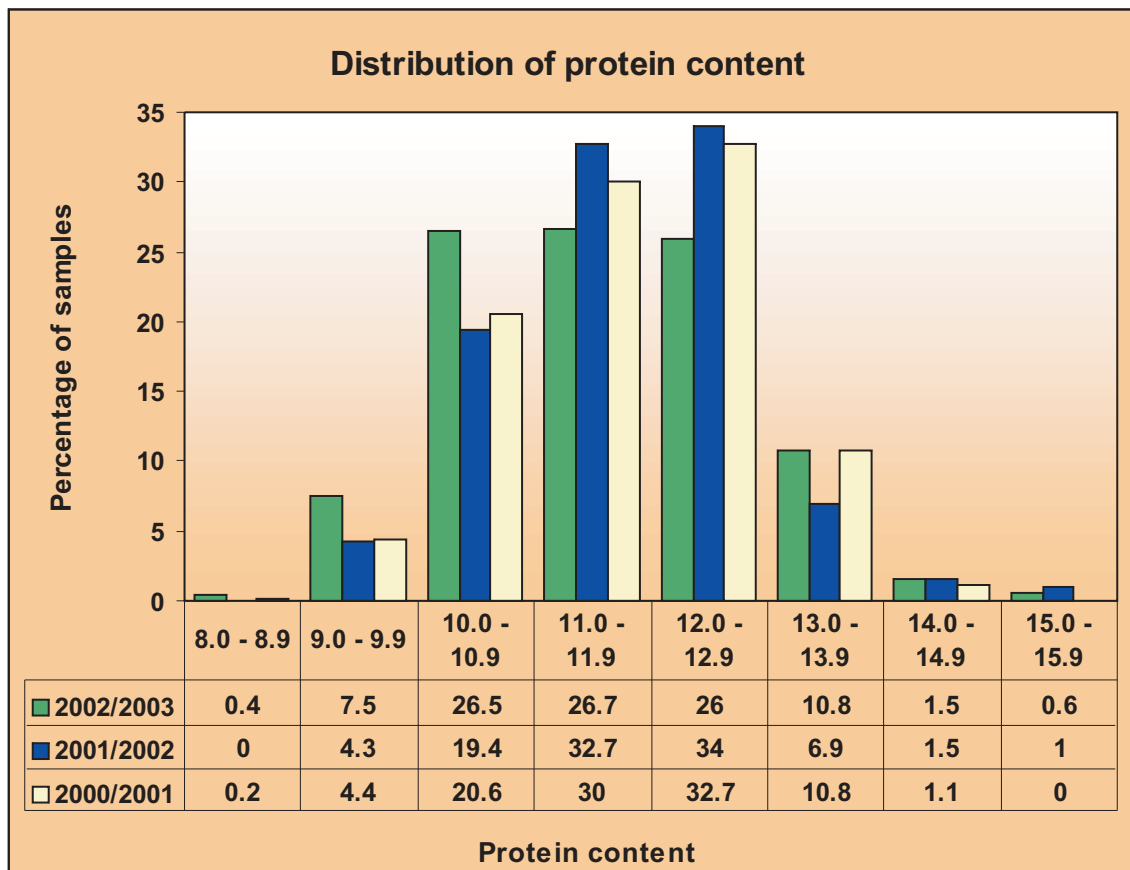
The average Farinogram water absorption was 63,5 %. The Western Cape wheat averaged 62,5 %, Free State wheat 62,9 % while the wheat from the Irrigation areas and the other Summer rainfall areas gave averages of 64,4 % and 64,5 % water absorption respectively. The average Farinogram development time was 3,9 minutes and stability was 5,2 minutes.

The baking tests showed a very good relationship between protein content and bread volume. The Irrigation wheat showed an excellent relationship.

## WHEAT PRODUCTION IN THE RSA OVER THE LAST 10 SEASONS

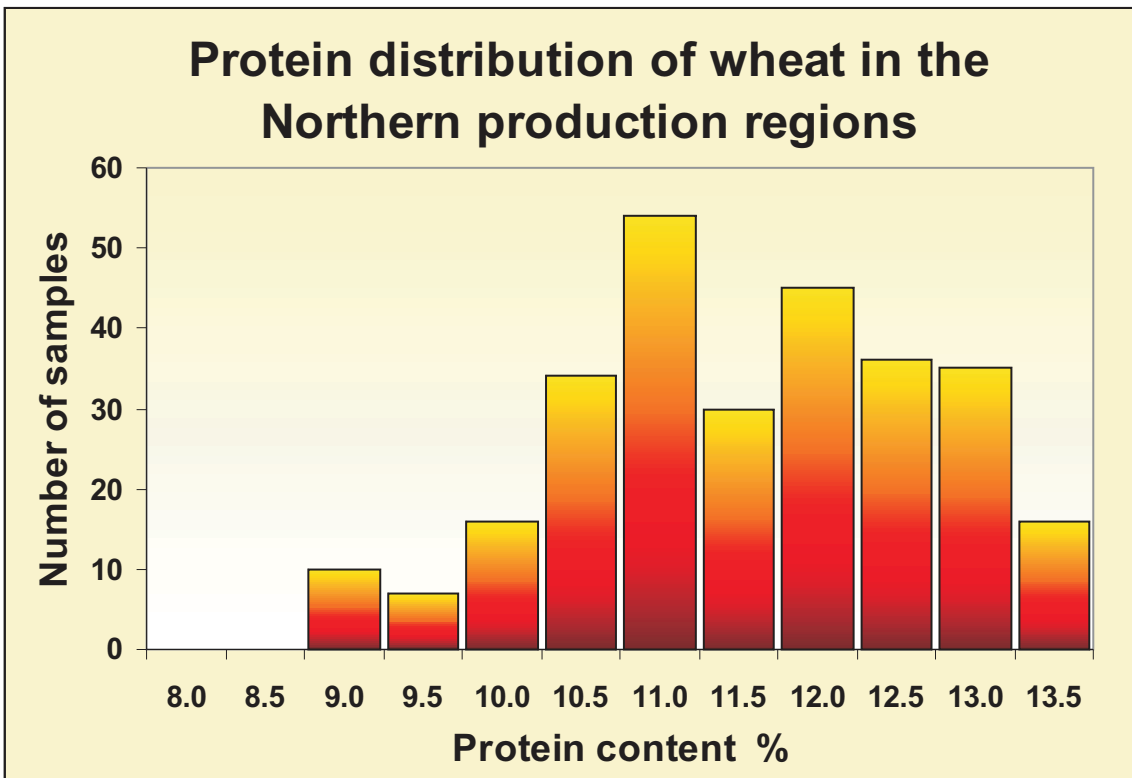
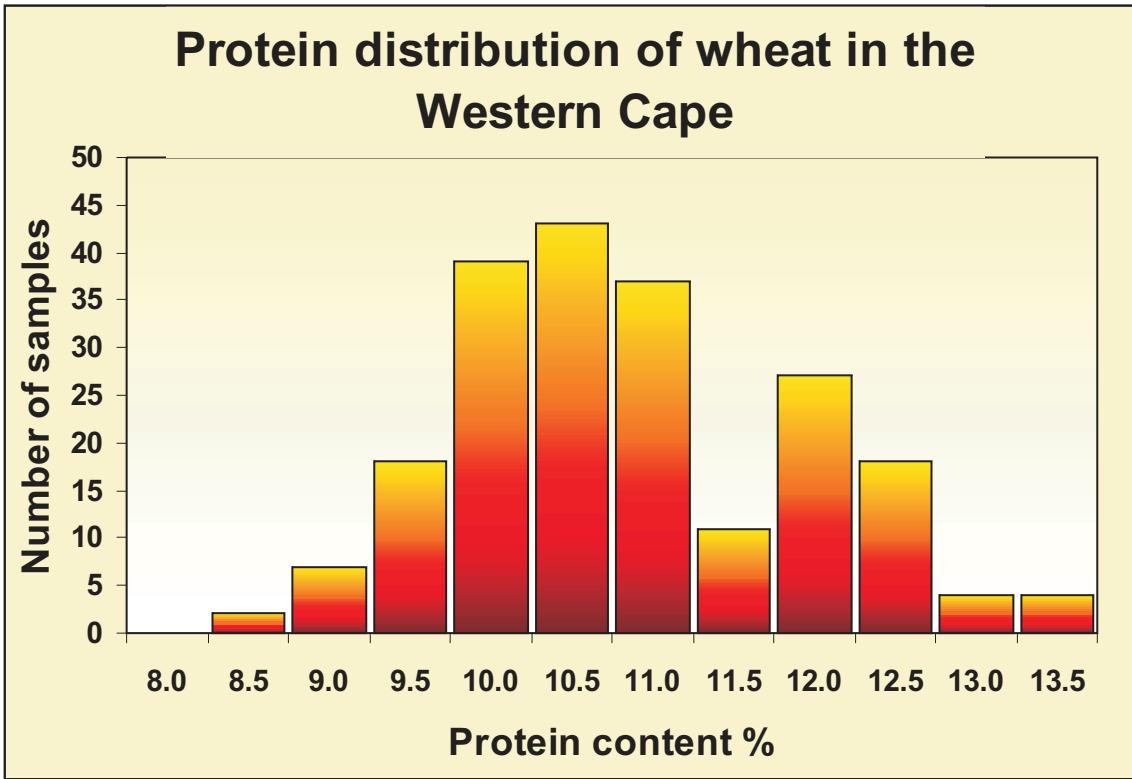


## DIFFERENCES IN THE DISTRIBUTION OF PROTEIN CONTENT OVER THE LAST 3 SEASONS



# REGIONAL QUALITY WEIGHTED AVERAGES

|  | Western<br>Cape<br>Province | Free State<br>Province | Vaal &<br>Oranje river<br>area | Other<br>Summer<br>rainfall areas | RSA<br>average |
|--|-----------------------------|------------------------|--------------------------------|-----------------------------------|----------------|
| <b>Regions</b>                                   |                             |                        |                                |                                   |                |
| Hectolitre mass dirty, kg/hl                     |                             |                        |                                |                                   |                |
| 1000 kernel mass (13 % mb), g                    |                             |                        |                                |                                   |                |
| Falling number, sec                              |                             |                        |                                |                                   |                |
| Screenings (1,786 mm), %                         |                             |                        |                                |                                   |                |
| Protein (12 % mb), %                             |                             |                        |                                |                                   |                |
| Mixogram peak time, min                          |                             |                        |                                |                                   |                |
| Bühler extraction, %                             |                             |                        |                                |                                   |                |
| Flour colour, KJ                                 |                             |                        |                                |                                   |                |
| <i>Farinogram:</i>                               |                             |                        |                                |                                   |                |
| - water absorption, %                            |                             |                        |                                |                                   |                |
| - development time, min                          |                             |                        |                                |                                   |                |
| - stability, min                                 |                             |                        |                                |                                   |                |
| Relationship between<br>protein and bread volume |                             |                        |                                |                                   |                |



# REGIONAL QUALITY

## WINTER RAINFALL AREA

### (Western Cape)

Production regions 1 to 6 fall within the Winter rainfall area, namely the southern and western Western Cape. Excellent weather conditions prevailed during the season, and no specific problems occurred.

The final crop production estimation in the Western Cape was 938 350 tons (NCEC), which is 40 % of the total South African wheat crop. The thousand kernel mass averaged 34,7 g (same as the wheat from the Free State, but less than the other Summer rainfall and Irrigation areas (39,5 g)). Screenings on a 1,786 mm sieve averaged 1,50 %.

The protein averaged 11,2 % (12 % mb) which is less than the previous season (12,0 %). The protein of the southeasterly planting area and the western planting area averaged the same.

The hectolitre mass averaged 78,5 kg/hl (77,2 kg/hl last season). The falling numbers were good (average of 370 seconds).

Mixogram peak time (wheat milled on Quadromat) averaged 2,8 minutes (3,0 minutes the previous season).

Flour extraction averaged 76,3 %, which is higher than the previous season's 75,0 %. The extraction is average to the Free State but about 2 % lower than the wheat from the other Summer rainfall areas and Irrigation areas.

The flour colour averaged -0,2 KJ units. Dough quality was good, with average water absorption (62,5 %), development time (4,4 minutes) and stability (5,2 minutes) comparing with the previous season.

The relationship between protein content and bread volume was good.

## SUMMER RAINFALL AREA

### (Free State)

Production regions 21 to 28 fall within the Free State Province and were estimated to have a production of 756 000 tons (NCEC). The thousand kernel mass averaged 34,2 g. Good to fair weather prevailed during the season, except for some dry spells (lasting up to two weeks) that occurred during the growing season. The average screenings (1,786 mm sieve) were 1,20 %.

The protein averaged 12,0 %, which is a little better than last season (11,6 %). The average protein content in the Northern and Central areas was slightly higher (0,2 %) than in the Southwestern and Eastern areas. The hectolitre mass averaged 77,9 kg/hl and was 0,8 kg/hl higher than the previous year.

The falling number values averaged higher than 320 seconds.

Flour extraction (average 76,1 %) was about 2 % lower than for the wheat of the Western Cape and Irrigation areas.

The mixogram peak times averaged 3,4 minutes against 3,9 minutes the previous season.

The flour colour averaged -0,4 KJ units. Dough quality was good, with water absorption averaging 62,9 % (61,9 % during 2001/2002), development time 4,0 minutes (4,1 minutes the previous season) and stability 6,6 minutes (6,8 minutes during 2001/2002).

The relationship between protein content and bread volume was very good.

## **SUMMER RAINFALL AREA** (Eastern Cape, North West, Mpumalanga and Limpopo)

This includes regions 12, 14 to 20, 30, 34, 35 and 36. The estimated crop production for these regions was 301 475 tons (NCEC).

Good to fair weather conditions prevailed during this season. The thousand kernel mass averaged 39,0 g, which is about 4 g higher than that of the Western Cape and the Free State.

The average protein content was 11,8 % (the same as the previous season). The hectolitre mass averaged 79,8 kg/hl (76,4 kg/hl in 2001/2002). The average falling number value was 360 seconds.

Flour extraction averaged 78,4 % against 77,0 % the previous season.

The mixogram peak time average was 2,3 minutes.

The flour colour averaged -0,2 KJ units. Dough quality was very good, with water absorption averaging 64,5 % (61,5 % the previous season), development time 4,2 minutes (4,6 minutes the previous season) and stability 5,2 minutes (6,3 minutes the previous season).

The relationship between protein content and bread volume was very good.

## **IRRIGATION AREA** (Vaal and Orange Rivers)

The majority of irrigation intake silos are in regions 10 and 11, with an estimated crop production of 272 500 tons (NCEC). This area contributes about 12 % of the approximately 20 % of irrigation wheat in South Africa. Irrigation wheat is also produced in some dryland areas such as Limpopo, Mpumalanga, Eastern Free State and Eastern Cape. Irrigation wheat in these areas contributes to approximately 40 % of the wheat produced here.

Good weather conditions prevailed during this season. The thousand kernel mass averaged 39,9 g, which is about 5 g better than the wheat of the Western Cape and Free State areas.

The protein averaged 11,7 %, which is 0,3 % lower than the previous year. The falling number averaged 380 seconds. The hectolitre mass average was 80,1 kg/hl (77,3 kg/hl during 2001/2002), the highest of all areas.

Büchler flour extraction was very good, with an average of 78,2 %, which is more or less the same as the previous season (78,0 %).

The mixogram peak time averaged 2,1 minutes (2,9 minutes during 2001/2002).

The flour from this area gave the brightest average colour of -0,9 KJ units. The relationship between protein content and bread volume was excellent. Dough quality was very good, with water absorption averaging 64,4 % (61,3 % during 2001/2002), development time 4,0 minutes (4,1 minutes the previous season) and stability 4,7 minutes (5,4 minutes the previous season).



**SOUTH AFRICAN  
WINTER RAINFALL WHEAT  
Western Cape Province**

| PRODUCTION REGION                   | (1)<br>Namakwaland  | (2)<br>Swartland<br>Western Region                  | (3)<br>Swartland<br>Central Region   |
|-------------------------------------|---|---|--|
| Intake silos                        | Bitterfontein<br>Graafwater<br>Landplaas<br>Vanrhynsdorp<br>Vredendal | Bergrivier<br>Darling<br>Koperfontein<br>Vredenburg | Eendekuil<br>Klipheuwel<br>Koringberg<br>Malmesbury<br>Moorreesburg<br>Moravia<br>Piketberg<br>Pools<br>Ruststasie |
| <b>WHEAT</b>                        |   |   |  |
| Protein (12%mb), %                  |   |   |  |
| Falling number, sec                 |   |   |  |
| 1000 Kernel mass (13%mb), g         |   |   |  |
| Hectolitre mass (dirty), kg/hl      |   |   |  |
| Screenings, %                       |   |   |  |
| Field fungi, %                      |   |   |  |
| <b>Number of samples</b>            |   |   |  |
| <b>CULTIVARS</b>                    |   |   |  |
| SST 94                              | 33.2  | 7.8   | 11.3   |
| cultivars with highest % occurrence | SST 57<br>SST 88<br>SST 825<br>SST 65                                 | 27.8<br>22.5<br>12.0<br>4.5                         | 14.2<br>61.0<br>0.3<br>11.8  |
|                                     |   |   | 14.7<br>54.0<br>1.8<br>12.0  |
| <b>Number of samples</b>            |   |   |  |
| <b>MIXOGRAM (Quadromat)</b>         |   |   |  |
| Peak time, min                      |   |   |  |
| Tail height (6min), mm              |   |   |  |
| <b>Number of samples</b>            |   |   |  |
|                                     | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>                                  | <b>B1 B2 B3 B4</b>   |
| <b>BÜHLER EXTRACTION, %</b>         |   | 73.7 72.5 72.9 70.6                                 | 74.5 72.8 72.0 72.4  |
| <b>FLOUR</b>                        |   |   |  |
| Protein (12%mb), %                  |   |   |  |
| Colour, KJ                          |   | -1.0 -0.8 -0.4 1.0                                  | -1.0 -1.2 -0.9 -0.6  |
| <b>FARINOGRAM</b>                   |   |   |  |
| Water absorption (14%mb), %         |   | 59.5 59.2 60.1 59.7                                 | 59.6 59.3 59.8   |
| Development time, min               |   | 4.5 4.8 4.3 5.3                                     | 3.8 3.8 4.7  |
| Stability, min                      |   | 7.2 7.2 7.0 8.8                                     | 6.1 6.2 7.7  |
| Mixing Tolerance Index, BU          |   | 46 48 46 33   | 50 55 42   |
| <b>EXTENSOGRAM (45 min pull)</b>    |   |   |  |
| Area, cm <sup>2</sup>               |   | 135 132 145 122                                     | 107 102 103  |
| Maximum height, BU                  |   | 390 440 395 420                                     | 385 375 390  |
| Extensibility, cm                   |   | 19.1 19.1 19.6 19.2                                 | 19.0 18.1 18.4   |
| <b>ALVEOGRAM</b>                    |   |   |  |
| Strength, cm <sup>2</sup>           |   | 43.7 42.4 43.7 46.8                                 | 44.3 37.2 45.3   |
| Stability (P), mm                   |   | 80 78 79 79   | 77 77 77   |
| Distensibility (L), mm              |   | 130 133 140 146                                     | 152 117 151  |
| Configuration ratio (P/L)           |   | 0.62 0.58 0.56 0.54                                 | 0.51 0.66 0.51   |
| <b>100g BAKING TEST</b>             |   |   |  |
| Loaf volume, cm <sup>3</sup>        |   | 940 925 945 940                                     | 1000 930 1035  |
| Evaluation                          |   | 0 0 1 2   | 0 0 0  |



**SOUTH AFRICAN  
WINTER RAINFALL WHEAT  
Western Cape Province**

| PRODUCTION REGION                   | (4)<br>Swartland<br>Eastern Region                                       | (5)<br>Ruens<br>Western Region   | (6)<br>Ruens<br>Eastern Region   |
|-------------------------------------|--|--|--|
| Intake silos                        | Ceres<br>Gouda<br>Halfmanshof<br>Leliedam<br>Porterville<br>Riebeeck-Wes | Bredasdorp<br>Caledon<br>Klipdale<br>Krige<br>Napier<br>Protém<br>Rietpoel<br>Villiersdorp | Albertinia<br>Ashton<br>Camfer<br>Heidelberg<br>Karringmelksrivier<br>Kleinberg<br>Protém<br>Riversdal<br>Swellendam |
| <b>WHEAT</b>                        |  |  |  |
| Protein (12%mb), %                  |  |  |  |
| Falling number, sec                 |  |  |  |
| 1000 Kernel mass (13%mb), g         |  |  |  |
| Hectolitre mass (dirty), kg/hl      |  |  |  |
| Screenings, %                       |  |  |  |
| Field fungi, %                      |  |  |  |
| <b>Number of samples</b>            |  |  |  |
| <b>CULTIVARS</b>                    |  |  |  |
| SST 88                              | 51.6   | 39.0   | 19.6   |
| cultivars with highest % occurrence | SST 57<br>SST 94<br>SST 65<br>SST 825                                    | 22.5<br>11.9<br>9.8<br>0.3   | 25.5<br>22.5<br>8.9<br>0.7   |
|                                     |  |  | 35.6<br>29.5<br>6.5<br>5.6   |
| <b>Number of samples</b>            |  |  |  |
| <b>MIXOGRAM (Quadromat)</b>         |  |  |  |
| Peak time, min                      |  |  |  |
| Tail height (6min), mm              |  |  |  |
| <b>Number of samples</b>            |  |  |  |
|                                     | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   |
| <b>BÜHLER EXTRACTION, %</b>         | 74.4 74.4 73.4 71.9  | 75.0 75.0 75.3 75.9  | 74.9 75.3 74.5 74.0  |
| <b>FLOUR</b>                        |  |  |  |
| Protein (12%mb), %                  |  |  |  |
| Colour, KJ                          | -1.0 -1.2 -1.0 -1.1  | -1.5 -1.6 -1.0 -1.0  | -1.2 -1.1 -1.7 -1.7  |
| <b>FARINOGRAM</b>                   |  |  |  |
| Water absorption (14%mb), %         | 60.1 59.3 58.6   | 62.5 61.1 60.9 61.8  | 62.3 59.7 56.9   |
| Development time, min               | 4.0 4.3 3.7  | 3.8 3.5 3.3 1.8  | 4.2 3.8 2.0  |
| Stability, min                      | 5.5 6.0 5.0  | 3.8 4.8 4.8 4.0  | 5.8 5.1 5.2  |
| Mixing Tolerance Index, BU          | 57 61 65   | 66 76 69 67  | 64 74 66   |
| <b>EXTENSOGRAM (45 min pull)</b>    |  |  |  |
| Area, cm <sup>2</sup>               | 101 78 66  | 70 52 42 42  | 62 56 60   |
| Maximum height, BU                  | 445 335 315  | 270 220 215 240  | 270 265 335  |
| Extensibility, cm                   | 15.5 15.9 14.4   | 17.4 14.6 13.3 11.8  | 15.5 14.8 12.6   |
| <b>ALVEOGRAM</b>                    |  |  |  |
| Strength, cm <sup>2</sup>           | 39.9 35.0 30.4   | 29.7 24.5 24.0 22.8  | 28.7 26.0 23.7   |
| Stability (P), mm                   | 79 76 75   | 79 78 82 95  | 91 80 72   |
| Distensibility (L), mm              | 128 115 95   | 88 72 64 45  | 65 69 70   |
| Configuration ratio (P/L)           | 0.62 0.66 0.79   | 0.90 1.09 1.27 2.08  | 1.39 1.17 1.03   |
| <b>100g BAKING TEST</b>             |  |  |  |
| Loaf volume, cm <sup>3</sup>        | 935 860 905  | 865 830 760 680  | 820 785 705  |
| Evaluation                          | 0 0 0  | 1 0 1 2  | 1 0 1  |



# SOUTH AFRICAN

## IRRIGATION WHEAT

### Vaal and Orange river area

## SUMMER RAINFALL WHEAT (AND IRRIGATION)

### North-West Province

| PRODUCTION REGION                | (10)<br>Griekwaland -<br>West   | (11)<br>Vaalharts   | (12)<br>North-West<br>Western Region   | (14)<br>North-West<br>Southern<br>Region   | (16)<br>North-West<br>Central Eastern<br>Region  |
|----------------------------------|---|---|--|--|--|
| Intake silos                     | Britstown<br>Douglas<br>Marydale<br>Modderivier<br>Oranjerivierstasie<br>Prieska<br>Rietrivier<br>Uppington | Barkly-Wes<br>Hartswater<br>Jan Kemp<br>Magogong<br>Taung | Bloubank<br>Buhrmannsdrif<br>Kameel<br>Kraaipan<br>Madibogo<br>Mafikeng<br>Mareetsane<br>Piet Plessis<br>Springbokpan<br>Vergeleë<br>Vryburg<br>Vryhof | Amalia<br>Barberspan<br>Delareyville<br>Excelsior<br>Geysdorp<br>Hallat's Hope<br>Migdol<br>Nooitgedacht<br>Schweizer-Reneke<br>Taaibospan | Bamboesspruit<br>Klerksdorp<br>Leeudoringstad<br>Makwassie<br>Regina<br>Steelpoort<br>Wolmaranstad |
| <b>WHEAT</b>                     |   |   |  |  |  |
| Protein (12%mb), %               |   |   |  |  |  |
| Falling number, sec              |   |   |  |  |  |
| 1000 Kernel mass (13%mb), g      |   |   |  |  |  |
| Hectolitre mass (dirty), kg/hl   |   |   |  |  |  |
| Screenings, %                    |   |   |  |  |  |
| Field fungi, %                   |   |   |  |  |  |
| <b>Number of samples</b>         |   |   |  |  |  |
| <b>CULTIVARS</b>                 |   |   |  |  |  |
| SST 806                          | 32.2  | 25.5  | 28.7   | 24.0   | 53.3   |
| cultivars SST 876                | 25.5  | 19.2  | 33.0   | 2.0  | 35.0   |
| with highest % SST 825           | 19.3  | 34.4  | 3.3  | 9.5  | 2.0  |
| occurrence Kariega               | 3.0   | 11.1  | 9.7  |  | 1.2  |
| SST 822                          | 0.6   | 1.1   | 12.3   | 64.5   |  |
| <b>Number of samples</b>         |   |   |  |  |  |
| <b>MIXOGRAM (Quadromat)</b>      |   |   |  |  |  |
| Peak time, min                   |   |   |  |  |  |
| Tail height (6min), mm           |   |   |  |  |  |
| <b>Number of samples</b>         |   |   |  |  |  |
|                                  | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   |
| <b>BÜHLER EXTRACTION, %</b>      | 75.1 75.8 75.5 75.1   | 75.5 75.4 74.7 74.8                                       |  |  |  |
| <b>FLOUR</b>                     |   |   |  |  |  |
| Protein (12%mb), %               |   |   |  |  |  |
| Colour, KJ                       | -1.1 -1.5 -1.4 -1.3   | -1.1 -1.0 -1.0 -0.8                                       |  |  |  |
| <b>FARINOGRAM</b>                |   |   |  |  |  |
| Water absorption (14%mb), %      | 61.9 61.6 61.9 59.2   | 62.5 61.7 60.6 63.7                                       |  |  |  |
| Development time, min            | 4.2 3.7 3.0 2.3   | 3.7 4.0 3.7 3.7   |  |  |  |
| Stability, min                   | 5.9 5.3 4.1 3.5   | 4.9 5.9 5.6 5.3   |  |  |  |
| Mixing Tolerance Index, BU       | 56 68 80 88   | 70 56 61 62   |  |  |  |
| <b>EXTENSOGRAM (45 min pull)</b> |   |   |  |  |  |
| Area, cm2                        | 84 64 56 43   | 70 69 75 70   |  |  |  |
| Maximum height, BU               | 320 290 250 225   | 270 290 310 305   |  |  |  |
| Extensibility, cm                | 18.0 15.3 15.3 13.3   | 17.6 16.3 15.7 16.3                                       |  |  |  |
| <b>ALVEOGRAM</b>                 |   |   |  |  |  |
| Strength, cm2                    | 38.7 31.8 28.6 20.5   | 37.2 34.6 34.3 35.0                                       |  |  |  |
| Stability (P), mm                | 86 88 87 75   | 87 85 82 96   |  |  |  |
| Distensibility (L), mm           | 107 81 74 59  | 106 97 101 80   |  |  |  |
| Configuration ratio (P/L)        | 0.81 1.08 1.17 1.27   | 0.82 0.87 0.81 1.20                                       |  |  |  |
| <b>100g BAKING TEST</b>          |   |   |  |  |  |
| Loaf volume, cm3                 | 950 900 860 790   | 955 880 905 825   |  |  |  |
| Evaluation                       | 0 0 0 0   | 0 0 0 1   |  |  |  |



**SOUTH AFRICAN**  
**SUMMER RAINFALL WHEAT (AND IRRIGATION)**  
**North-West Province**

| PRODUCTION REGION                     | (17)<br>North-West<br>Central Northern<br>Region (Ottosdal)  | (18)<br>North-West<br>Central Region<br>(Ventersdorp)   | (19)<br>North-West<br>Central Region<br>(Lichtenburg)                    | (20)<br>North-West<br>Eastern Region  |
|---------------------------------------|--|---|--|---|
| Intake silos                          | Bospoort<br>Hartbeesfontein<br>Kleinharts<br>Melliodora<br>Ottosdal<br>Rostrataville<br>Vermaas<br>Werda | Bodenstein<br>Buckingham<br>Coligny<br>Enselspruit<br>Makokskraal<br>Potchefstroom<br>Ventersdorp | Grootpan<br>Halfpad<br>Hibernia<br>Lichtenburg<br>Lottiehalte<br>Lusthof | Battery<br>Boons<br>Brits<br>Derby<br>Koster<br>Rustenburg<br>Swaruggens<br>Syferbult |
| <b>WHEAT</b>                          |  |   |  |   |
| Protein (12%mb), %                    |  |   |  |   |
| Falling number, sec                   |  |   |  |   |
| 1000 Kernel mass (13%mb), g           |  |   |  |   |
| Hectolitre mass (dirty), kg/hl        |  |   |  |   |
| Screenings, %                         |  |   |  |   |
| Field fungi, %                        |  |   |  |   |
| <b>Number of samples</b>              |  |   |  |   |
| <b>CULTIVARS</b>                      |  |   |  |   |
| SST 806                               | 59.4   | 40.0  | 46.6   | 31.9  |
| cultivars SST 876                     | 31.6   | 22.0  | 27.8   | 26.9  |
| with highest %<br>occurrence Olifants | 4.0  | 11.0  | 5.2  | 9.2   |
| SST 825                               | 2.4  | 2.5   | 6.3  | 6.1   |
| Kariega                               | 0.4  | 10.0  | 0.3  | 6.7   |
| <b>Number of samples</b>              |  |   |  |   |
| <b>MIXOGRAM (Quadromat)</b>           |  |   |  |   |
| Peak time, min                        |  |   |  |   |
| Tail height (6min), mm                |  |   |  |   |
| <b>Number of samples</b>              |  |   |  |   |
|                                       | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>  |
| <b>BÜHLER EXTRACTION, %</b>           | 76.1 76.4 74.0 76.0  | 75.4  | 75.6 76.4 75.2   | 76.1 75.0 75.0  |
| <b>FLOUR</b>                          |  |   |  |   |
| Protein (12%mb), %                    |  |   |  |   |
| Colour, KJ                            | -1.4 -0.6 -0.8 -0.9  | -0.8  | -0.1 -1.1 0.2  | -0.3 -0.9 -1.4  |
| <b>FARINOGRAM</b>                     |  |   |  |   |
| Water absorption (14%mb), %           | 62.4 62.1 54.0 58.2  | 61.0  | 63.6 62.6 63.1   | 62.8 59.1 58.5  |
| Development time, min                 | 5.2 5.2 5.3 2.3  | 5.2   | 4.2 4.2 4.8  | 4.7 4.2 3.3   |
| Stability, min                        | 8.5 7.4 8.9 4.9  | 7.9   | 6.2 5.3 5.7  | 7.0 7.0 5.6   |
| Mixing Tolerance Index, BU            | 41 53 43 65  | 48  | 53 69 70   | 56 52 62  |
| <b>EXTENSOGRAM (45 min pull)</b>      |  |   |  |   |
| Area, cm2                             | 145 120 139 65   | 144   | 106 107 108  | 114 115 73  |
| Maximum height, BU                    | 430 435 470 300  | 450   | 325 335 315  | 370 440 345   |
| Extensibility, cm                     | 21.8 18.5 18.6 15.0  | 20.3  | 19.8 18.1 18.2   | 20.8 16.9 15.2  |
| <b>ALVEOGRAM</b>                      |  |   |  |   |
| Strength, cm2                         | 53.2 49.2 35.9 28.0  | 47.7  | 41.1 37.3 40.7   | 46.8 39.1 30.0  |
| Stability (P), mm                     | 90 94 48 73  | 86  | 90 86 91   | 92 79 79  |
| Distensibility (L), mm                | 141 124 187 88   | 128   | 110 104 107  | 118 115 86  |
| Configuration ratio (P/L)             | 0.64 0.76 0.25 0.84  | 0.67  | 0.81 0.83 0.86   | 0.78 0.69 0.92  |
| <b>100g BAKING TEST</b>               |  |   |  |   |
| Loaf volume, cm3                      | 990 880 1035 755   | 1005  | 960 890 945  | 995 845 780   |
| Evaluation                            | 0 0 0 0  | 0   | 0 0 0  | 0 0 0   |





# SOUTH AFRICAN

## SUMMER RAINFALL WHEAT (AND IRRIGATION)

### Free State Province (Central)

### Free State Province (Northern)

| PRODUCTION REGION                | (21)  | (26)  | (27)   | (22)  | (23)   |
|----------------------------------|---|---|--|---|--|
|                                  | Free State<br>North-Western<br>Region<br>(Viljoenskroon)  | Free State<br>South-Eastern<br>Region   | Free State<br>Northern<br>Region   | Free-State<br>North-Western<br>Region<br>(Bothaville)                               | Free-State<br>North-Western<br>Region<br>(Bultfontein)                             |
| Intake silos                     | Attie<br>Groenebloem<br>Heuningspruit<br>Koppies<br>Rooiwal<br>Vierfontein<br>Viljoenskroon<br>Vredefort<br>Weiveld | Arlington<br>Kaallaagte<br>Libertas<br>Marquard<br>Meets<br>Monte Video<br>Senekal<br>Steynsrus | Gottenburg<br>Heilbron<br>Hoogte<br>Mooigeleë<br>Petrus Steyn<br>Wolwehoek | Allanridge<br>Bothaville<br>Mirage<br>Odendaalsrus<br>Schoonspruit<br>Schuttendraai | Bultfontein<br>Losdoorns<br>Protespan<br>Tierfontein<br>Wesselsbrun<br>Willemsrust |
| <b>WHEAT</b>                     |   |   |  |   |  |
| Protein (12%mb), %               |   |   |  |   |  |
| Falling number, sec              |   |   |  |   |  |
| 1000 Kernel mass (13%mb), g      |   |   |  |   |  |
| Hectolitre mass (dirty), kg/hl   |   |   |  |   |  |
| Screenings, %                    |   |   |  |   |  |
| Field fungi, %                   |   |   |  |   |  |
| <b>Number of samples</b>         |   |   |  |   |  |
| <b>CULTIVARS</b>                 |   |   |  |   |  |
| Elands                           | 25.0  | 22.9  | 28.8   | 2.6   | 4.6  |
| cultivars PAN 3349               | 23.9  | 5.4   | 2.4  | 14.0  | 5.1  |
| with highest %<br>occurrence     | Gariep<br>SST 506   | 20.0<br>1.0   | 7.7<br>15.7  | 2.0<br>34.6   | 8.6<br>37.0  |
| SST 399                          |   | 25.8  | 12.0   | 5.2   | 2.1  |
| <b>Number of samples</b>         |   |   |  |   |  |
| <b>MIXOGRAM (Quadromat)</b>      |   |   |  |   |  |
| Peak time, min                   |   |   |  |   |  |
| Tail height (6min), mm           |   |   |  |   |  |
| <b>Number of samples</b>         |   |   |  |   |  |
|                                  | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>  | <b>B1 B2 B3 B4</b>   |
| <b>BÜHLER EXTRACTION, %</b>      | 74.1 74.8   | 74.1 73.1 73.6  | 74.9 74.6 74.2   | 75.9 72.8   | 74.2 74.2 74.2 72.5  |
| <b>FLOUR</b>                     |   |   |  |   |  |
| Protein (12%mb), %               |   |   |  |   |  |
| Colour, KJ                       | 0.3 0.3   | 0.2 -0.3 0.8  | 1.0 -0.6 0.1   | -0.9 -1.2   | -0.6 -0.8 -0.9 0.1   |
| <b>FARINOGRAM</b>                |   |   |  |   |  |
| Water absorption (14%mb), %      | 61.8 63.1   | 62.9 62.5 63.9  | 64.4 62.2 64.5   | 60.8 58.7   | 62.2 61.3 61.6 64.5  |
| Development time, min            | 4.7 5.9   | 5.2 5.3 5.7   | 5.3 4.8 5.9  | 3.8 1.6   | 5.2 4.8 4.5 4.8  |
| Stability, min                   | 7.7 8.4   | 6.8 8.5 7.0   | 6.6 7.7 6.8  | 5.8 5.0   | 7.4 7.7 6.8 5.4  |
| Mixing Tolerance Index, BU       | 48 44   | 49 44 55  | 55 39 60   | 57 63   | 48 51 54 65  |
| <b>EXTENSOGRAM (45 min pull)</b> |   |   |  |   |  |
| Area, cm2                        | 122 129   | 130 125 125   | 105 121 105  | 132 89  | 120 100 115 95   |
| Maximum height, BU               | 430 440   | 420 540 380   | 405 420 385  | 425 430   | 415 395 380 325  |
| Extensibility, cm                | 19.2 19.0   | 21.0 15.9 22.8  | 17.7 19.7 18.7   | 20.0 15.6   | 20.0 17.4 21.2 20.1  |
| <b>ALVEOGRAM</b>                 |   |   |  |   |  |
| Strength, cm2                    | 54.1 52.9   | 53.8 56.9 53.8  | 45.4 45.9 46.2   | 42.7 35.9   | 47.1 44.2 42.0 38.8  |
| Stability (P), mm                | 96 100  | 92 100 90   | 97 91 95   | 84 89   | 97 97 79 85  |
| Distensibility (L), mm           | 120 111   | 130 121 129   | 105 116 107  | 123 81  | 106 99 136 111   |
| Configuration ratio (P/L)        | 0.81 0.90   | 0.70 0.83 0.70  | 0.93 0.78 0.89   | 0.68 1.11   | 0.91 0.98 0.58 0.76  |
| <b>100g BAKING TEST</b>          |   |   |  |   |  |
| Loaf volume, cm3                 | 965 950   | 1015 990 1040   | 995 935 975  | 930 825   | 955 900 985 1010   |
| Evaluation                       | 1 2   | 1 1 2   | 0 1 2  | 0 0   | 0 0 0 1  |



# SOUTH AFRICAN

## SUMMER RAINFALL WHEAT (AND IRRIGATION)

### Free State Province (South-Western)

### Free State Province (Eastern)

| PRODUCTION REGION                | (24)   | (25)   | (28)   |      |
|----------------------------------|--|--|--|------|
|                                  | Free State<br>Central Region   | Free State<br>South-Western<br>Region  | Free State<br>Eastern Region   |      |
| Intake silos                     | Bloemfontein<br>Brandfort<br>De Brug<br>Geneva<br>Hennenman<br>Koffiefontein<br>Kroonstad<br>Petrusburg<br>Theunissen<br>Van Tonder<br>Welgeleë<br>Winburg | Bethlehem<br>Clocolan<br>De Wetsdorp<br>Ficksburg<br>Fouriesburg<br>Marseilles<br>Modderpoort<br>Slabberts<br>Tweespruit<br>Westminster<br>Zastron | Afrikaskop<br>Ascent<br>Cornelia<br>Daniëlsrus<br>Eeram<br>Frankfort<br>Harrismith<br>Jim Fouché<br>Kransfontein<br>Memel<br>Reitz<br>Tweeling<br>Villiers<br>Vrede<br>Warden<br>Windfield |      |
| <b>WHEAT</b>                     |  |  |  |      |
| Protein (12% mb), %              |  |  |  |      |
| Falling number, sec              |  |  |  |      |
| 1000 Kernel mass (13% mb), g     |  |  |  |      |
| Hectolitre mass (dirty), kg/hl   |  |  |  |      |
| Screenings, %                    |  |  |  |      |
| Field fungi, %                   |  |  |  |      |
| <b>Number of samples</b>         |  |  |  |      |
| <b>CULTIVARS</b>                 |  |  |  |      |
|                                  | Gariep   | 32.0   | 12.7   | 1.6  |
| cultivars                        | SST 806  | 18.2   | 1.4  | 12.1 |
| with highest %                   | PAN 3377   | 7.0  | 11.0   | 23.3 |
| occurrence                       | Elands   | 2.6  | 33.4   | 28.0 |
|                                  | SST 399  | 2.3  | 9.6  | 5.3  |
| <b>Number of samples</b>         |  |  |  |      |
| <b>MIXOGRAM (Quadromat)</b>      |  |  |  |      |
| Peak time, min                   |  |  |  |      |
| Tail height (6min), mm           |  |  |  |      |
| <b>Number of samples</b>         |  |  |  |      |
|                                  | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   |      |
| <b>BÜHLER EXTRACTION, %</b>      | 73.2 72.9 72.8 71.9  | 74.0 75.2 72.8 73.6  | 75.1 73.6 74.1 72.2  |      |
| <b>FLOUR</b>                     |  |  |  |      |
| Protein (12% mb), %              |  |  |  |      |
| Colour, KJ                       | -0.9 -0.5 -0.3 -0.8  | -0.9 -0.3 -0.7 0.0   | 0.3 0.5 0.0 0.1  |      |
| <b>FARINOGRAM</b>                |  |  |  |      |
| Water absorption (14% mb), %     | 62.5 61.7 62.2 60.2  | 63.8 62.2 62.3 62.2  | 64.2 63.4 63.4 64.3  |      |
| Development time, min            | 5.5 5.3 6.2 4.7  | 4.8 4.3 6.5 6.0  | 6.2 6.7 6.2 7.7  |      |
| Stability, min                   | 7.6 10.4 11.4 7.1  | 6.6 5.7 10.6 8.3   | 8.1 10.1 9.4 13.6  |      |
| Mixing Tolerance Index, BU       | 47 34 30 48  | 57 61 43 50  | 54 37 40 29  |      |
| <b>EXTENSOGRAM (45 min pull)</b> |  |  |  |      |
| Area, cm <sup>2</sup>            | 106 120 150 105  | 92 90 143 140  | 102 115 119 155  |      |
| Maximum height, BU               | 360 450 475 415  | 365 330 465 445  | 355 400 415 460  |      |
| Extensibility, cm                | 19.5 19.6 22.4 17.2  | 17.8 19.2 21.0 21.3  | 19.3 20.9 19.6 22.5  |      |
| <b>ALVEOGRAM</b>                 |  |  |  |      |
| Strength, cm <sup>2</sup>        | 44.0 48.2 53.7   |  | 46.8 54.4 54.3 66.4  |      |
| Stability (P), mm                | 91 94 94   |  | 97 98 101 106  |      |
| Distensibility (L), mm           | 110 106 122  |  | 113 117 110 134  |      |
| Configuration ratio (P/L)        | 0.82 0.89 0.77   |  | 0.86 0.84 0.92 0.79  |      |
| <b>100g BAKING TEST</b>          |  |  |  |      |
| Loaf volume, cm <sup>3</sup>     | 980 955 1030 915   | 980 980 1135 1125  | 1005 980 930 990   |      |
| Evaluation                       | 0 0 0 1  | 0 0 0 0  | 1 2 2 2  |      |



**SOUTH AFRICAN**  
**SUMMER RAINFALL WHEAT (AND IRRIGATION)**  
**Mpumalanga**

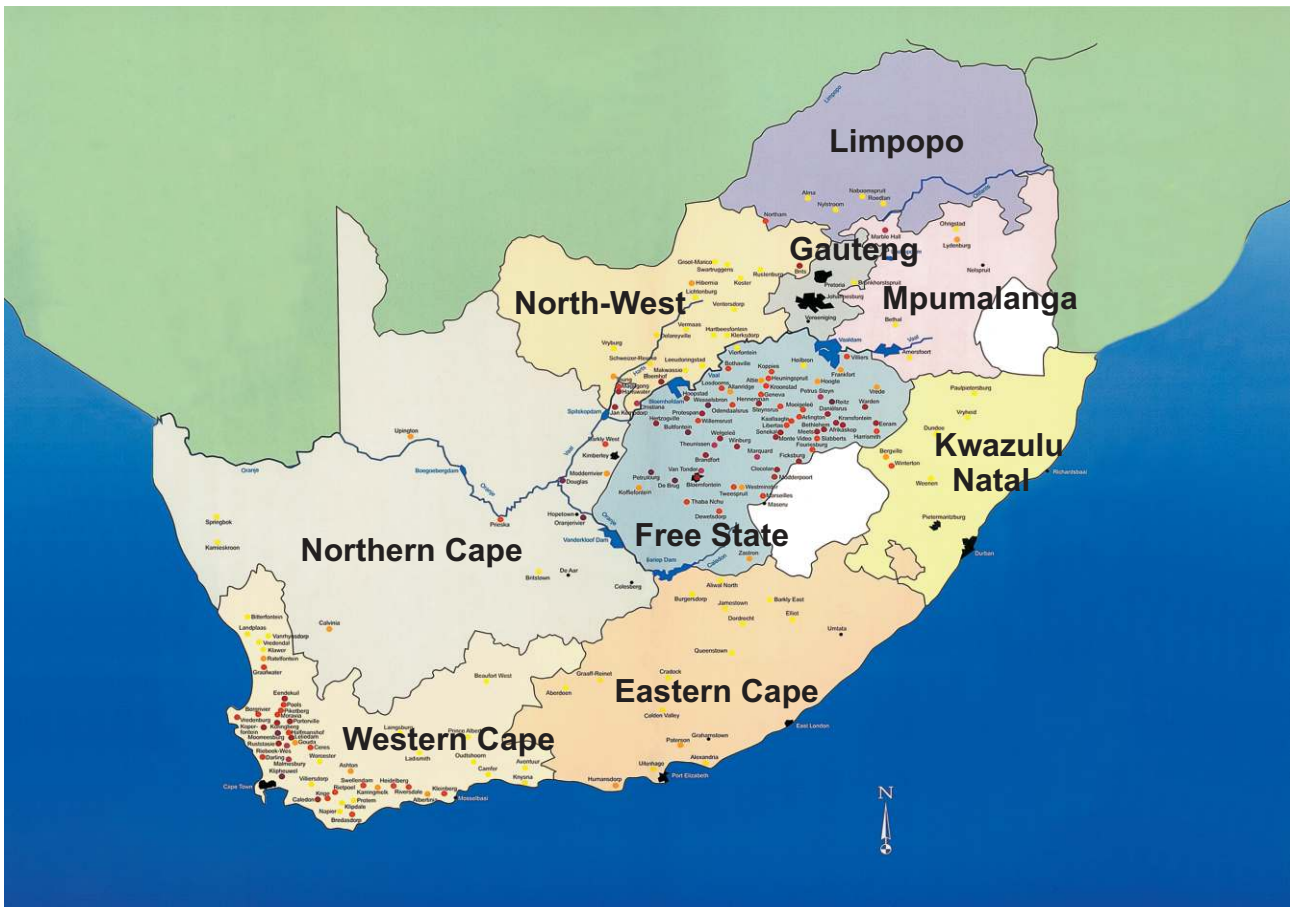
| PRODUCTION REGION                   | (30)<br>M pumalanga<br>Eastern Region  | (32)<br>M pumalanga<br>Western Region                                | (33)<br>M pumalanga<br>Northern Region  |
|-------------------------------------|--|--|---|
| Intake silos                        | Amersfoort<br>Badplaas<br>Carolina<br>Davel<br>Ermelo<br>Estancia<br>Lothair<br>Maizefield<br>Mkondo<br>Morgenzon<br>Overvaal<br>Panbult | Argent<br>Dryden<br>Endicott<br>Elof<br>Hawerklip<br>Kendal<br>Ogies | Driefontein<br>Lydenburg<br>Marble Hall<br>Middelburg<br>Stoffelberg<br>Pan<br>Arnot<br>Wonderfontein |
| <b>WHEAT</b>                        |  |  |   |
| Protein (12%mb), %                  |  |  |   |
| Falling number, sec                 |  |  |   |
| 1000 Kernel mass (13%mb), g         |  |  |   |
| Hectolitre mass (dirty), kg/hl      |  |  |   |
| Screenings, %                       |  |  |   |
| Field fungi, %                      |  |  |   |
| <b>Number of samples</b>            |  |  |   |
| <b>CULTIVARS</b>                    |  |  |   |
| SST 806                             | 40.5   | 78.3   | 38.2  |
| cultivars SST 825                   | 19.7   | 7.7  | 24.0  |
| with highest %<br>occurrence Elands | 16.8   |  |   |
| SST 876                             | 4.8  | 14.0   | 9.6   |
| SST 822                             |  |  | 16.4  |
| <b>Number of samples</b>            |  |  |   |
| <b>MIXOGRAM (Quadromat)</b>         |  |  |   |
| Peak time, min                      |  |  |   |
| Tail height (6min), mm              |  |  |   |
| <b>Number of samples</b>            |  |  |   |
|                                     | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>  |
| <b>BÜHLER EXTRACTION, %</b>         |  |  |   |
| <b>FLOUR</b>                        |  |  |   |
| Protein (12%mb), %                  |  |  |   |
| Colour, KJ                          |  |  |   |
| <b>FARINOGRAM</b>                   |  |  |   |
| Water absorption (14%mb), %         |  |  |   |
| Development time, min               |  |  |   |
| Stability, min                      |  |  |   |
| Mixing Tolerance Index, BU          |  |  |   |
| <b>EXTENSOGRAM (45 min pull)</b>    |  |  |   |
| Area, cm <sup>2</sup>               |  |  |   |
| Maximum height, BU                  |  |  |   |
| Extensibility, cm                   |  |  |   |
| <b>ALVEOGRAM</b>                    |  |  |   |
| Strength, cm <sup>2</sup>           |  |  |   |
| Stability (P), mm                   |  |  |   |
| Distensibility (L), mm              |  |  |   |
| Configuration ratio (P/L)           |  |  |   |
| <b>100g BAKING TEST</b>             |  |  |   |
| Loaf volume, cm <sup>3</sup>        |  |  |   |
| Evaluation                          |  |  |   |



**SOUTH AFRICAN**  
**SUMMER RAINFALL WHEAT (AND IRRIGATION)**  
**Gauteng, Limpopo and Kwazulu-Natal Provinces**

| PRODUCTION REGION                 | (34)<br>Gauteng  | (35)<br>Limpopo Region   | (36)<br>Kwazulu-Natal  |
|-----------------------------------|--|--|--|
| Intake silos                      | Bloekomspruit<br>Bronkhorstspruit<br>Glenroy<br>Goeie Hoek<br>Kaalfontein<br>Middelvlei<br>Nigel<br>Oberholzer<br>Raathsvlei | Alma<br>Crecy<br>Immerpan<br>Lehau<br>Naboomspruit<br>Northam<br>Nutfield<br>Nylstroom<br>Pienaarsrivier<br>Pietersburg<br>Potgietersrus<br>Roedtan<br>Settlers<br>Tzaneen<br>Vaalwater<br>Warmbad | Bergville<br>Bloedrivier<br>Dannhauser<br>Dundee<br>Mizpah<br>New A malfi<br>Paulpietersburg<br>Vryheid<br>Winterton |
| <b>WHEAT</b>                      |  |  |  |
| Protein (12%mb), %                |  |  |  |
| Falling number, sec               |  |  |  |
| 1000 Kernel mass (13% mb), g      |  |  |  |
| Hectolitre mass (dirty), kg/hl    |  |  |  |
| Screenings, %                     |  |  |  |
| Field fungi, %                    |  |  |  |
| <b>Number of samples</b>          |  |  |  |
| <b>CULTIVARS</b>                  |  |  |  |
| SST 806                           | 44.3   | 37.5   | 19.8   |
| cultivars SST 876                 | 16.3   | 25.9   | 24.5   |
| with highest % occurrence Kariega | 15.3   | 5.7  | 5.8  |
| SST 825                           | 12.5   | 6.8  | 36.0   |
| Olifants                          | 1.3  | 5.8  | 12.3   |
| <b>Number of samples</b>          |  |  |  |
| <b>MIXOGRAM (Quadromat)</b>       |  |  |  |
| Peak time, min                    |  |  |  |
| Tail height (6min), mm            |  |  |  |
| <b>Number of samples</b>          |  |  |  |
|                                   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   | <b>B1 B2 B3 B4</b>   |
| <b>BÜHLER EXTRACTION, %</b>       |  | 75.1 75.2 74.4   |  |
| <b>FLOUR</b>                      |  |  |  |
| Protein (12%mb), %                |  |  |  |
| Colour, KJ                        |  | -0.1 -0.4 -0.5   |  |
| <b>FARINOGRAM</b>                 |  |  |  |
| Water absorption (14%mb), %       |  | 62.5 61.8 60.5   |  |
| Development time, min             |  | 5.7 5.0 4.2  |  |
| Stability, min                    |  | 8.9 7.3 5.3  |  |
| Mixing Tolerance Index, BU        |  | 38 45 67   |  |
| <b>EXTENSOGRAM (45 min pull)</b>  |  |  |  |
| Area, cm <sup>2</sup>             |  | 107 103 81   |  |
| Maximum height, BU                |  | 430 400 360  |  |
| Extensibility, cm                 |  | 17.9 17.4 15.2   |  |
| <b>ALVEOGRAM</b>                  |  |  |  |
| Strength, cm <sup>2</sup>         |  | 47.2 40.5 29.7   |  |
| Stability (P), mm                 |  | 95 92 86   |  |
| Distensibility (L), mm            |  | 109 97 77  |  |
| Configuration ratio (P/L)         |  | 0.87 0.95 1.12   |  |
| <b>100g BAKING TEST</b>           |  |  |  |
| Loaf volume, cm <sup>3</sup>      |  | 885 965 815  |  |
| Evaluation                        |  | 2 0 0  |  |

# RSA WHEAT PRODUCTION AREAS



## WHEAT SEED SOLD BY GRAIN SILO OWNERS TO WHEAT PRODUCERS FOR THE 2003 PLANTING SEASON

Cultivar

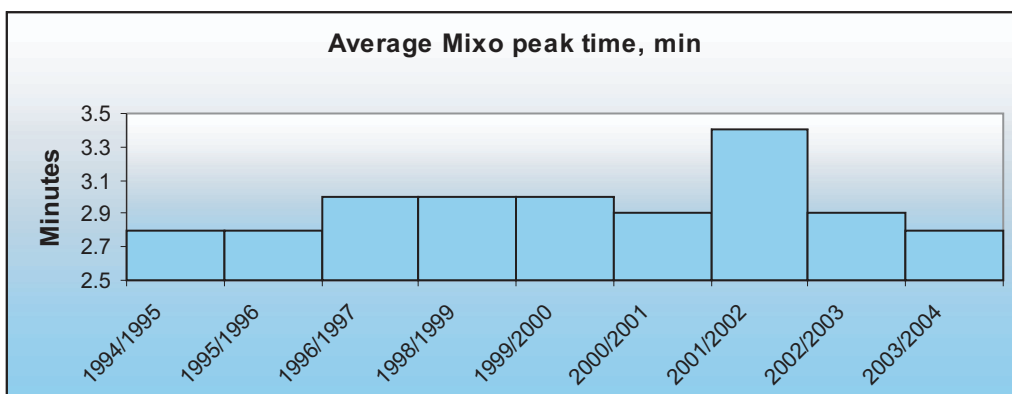
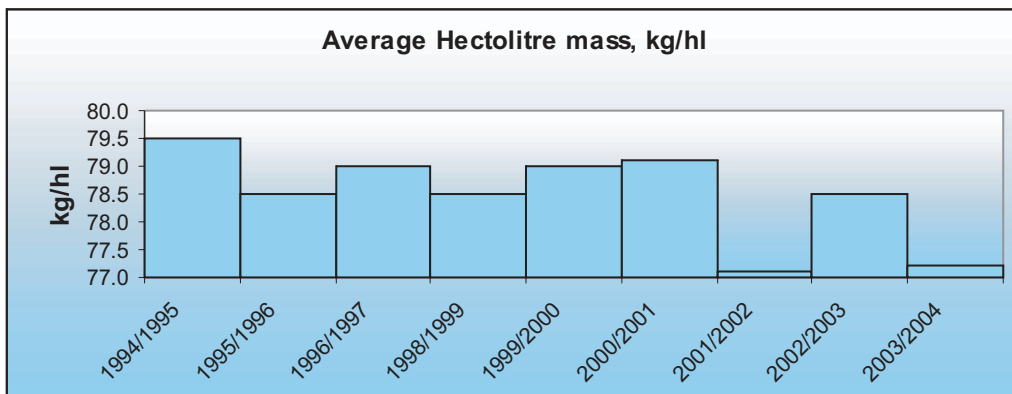
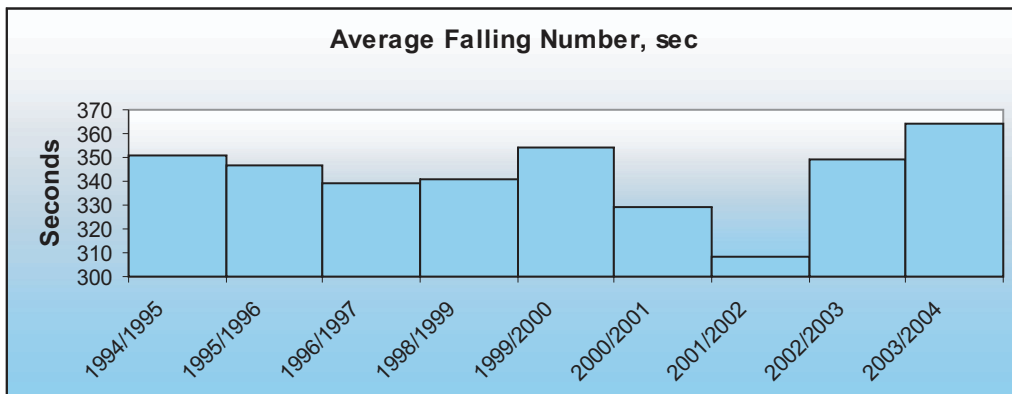
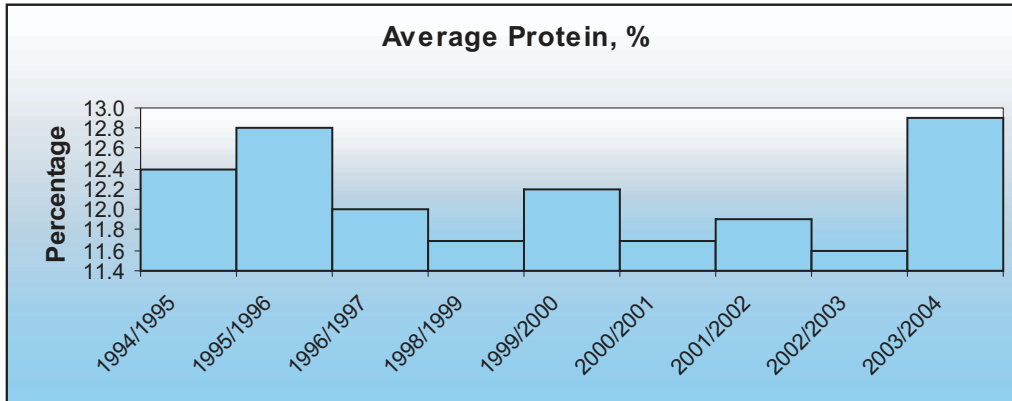
%

Cultivar

%



**AVERAGE QUALITY OVER 10 SEASONS (1997 / 1998 no data available)**



## WEIGHTED AVERAGE RESULTS FOR THE LAST THREE SEASONS

| Region      | 2003/2004                 |            |               |                    |            | 2002/2003                 |            |               |                    |            | 2001/2002                 |            |               |                    |            |
|-------------|---------------------------|------------|---------------|--------------------|------------|---------------------------|------------|---------------|--------------------|------------|---------------------------|------------|---------------|--------------------|------------|
|             | Protein<br>(12% mb),<br>% | FN,<br>sec | Hlm,<br>kg/hl | Mixo<br>PT,<br>min | <i>n</i>   | Protein<br>(12% mb),<br>% | FN,<br>sec | Hlm,<br>kg/hl | Mixo<br>PT,<br>min | <i>n</i>   | Protein<br>(12% mb),<br>% | FN,<br>sec | Hlm,<br>kg/hl | Mixo<br>PT,<br>min | <i>n</i>   |
| 1           | 11.5                      | 406        | 76.3          | 2.9                | 4          | 10.8                      | 369        | 79.4          | 2.8                | 4          | 10.8                      | 385        | 76.3          | 3.3                | 4          |
| 2           | 13.0                      | 407        | 75.3          | 2.9                | 24         | 11.2                      | 370        | 78.7          | 3.0                | 33         | 11.4                      | 378        | 76.9          | 3.0                | 22         |
| 3           | 13.0                      | 393        | 75.8          | 2.8                | 36         | 11.3                      | 363        | 77.7          | 2.8                | 88         | 11.4                      | 376        | 77.3          | 2.8                | 52         |
| 4           | 11.9                      | 384        | 77.2          | 2.7                | 23         | 11.0                      | 358        | 78.6          | 2.7                | 32         | 11.5                      | 369        | 77.4          | 2.9                | 34         |
| 5           | 10.8                      | 387        | 80.7          | 2.3                | 30         | 11.0                      | 363        | 79.2          | 2.6                | 27         | 12.1                      | 351        | 77.1          | 2.6                | 29         |
| 6           | 10.7                      | 386        | 79.3          | 2.8                | 17         | 11.4                      | 367        | 79.7          | 2.5                | 26         | 13.5                      | 335        | 77.3          | 2.7                | 17         |
| 7           | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | 11.6                      | 361        | 78.0          | 3.1                | 3          |
| 8           | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          |
| 9           | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          |
| 10          | 11.3                      | 419        | 79.5          | 2.4                | 19         | 11.4                      | 380        | 80.5          | 2.0                | 14         | 11.9                      | 362        | 77.4          | 2.6                | 25         |
| 11          | 11.8                      | 319        | 77.1          | 2.7                | 31         | 11.9                      | 397        | 79.9          | 2.2                | 22         | 12.2                      | 306        | 77.1          | 3.3                | 18         |
| 12          | 13.2                      | 363        | 76.8          | 3.0                | 3          | 11.8                      | 382        | 80.6          | 2.0                | 3          | 12.4                      | 316        | 76.3          | 3.2                | 5          |
| 13          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          |
| 14          | 13.5                      | 379        | 74.5          | 3.4                | 5          | 12.3                      | 346        | 80.0          | 2.4                | 4          | 12.3                      | 329        | 78.8          | 3.8                | 4          |
| 15          | -                         | -          | -             | -                  | -          | 11.2                      | 311        | 79.4          | 2.5                | 8          | 11.5                      | 265        | 76.2          | 3.5                | 15         |
| 16          | 12.3                      | 385        | 74.0          | 2.2                | 4          | 12.3                      | 350        | 80.4          | 1.9                | 2          | 12.6                      | 146        | 74.2          | 3.7                | 4          |
| 17          | 12.1                      | 370        | 77.5          | 2.7                | 7          | 11.7                      | 327        | 77.9          | 2.1                | 5          | 12.0                      | 300        | 74.8          | 3.1                | 9          |
| 18          | 13.2                      | 367        | 79.6          | 3.2                | 2          | 12.4                      | 397        | 82.7          | 2.3                | 3          | 11.6                      | 310        | 77.0          | 3.7                | 3          |
| 19          | 12.9                      | 365        | 78.5          | 2.6                | 12         | 11.4                      | 360        | 80.8          | 2.3                | 3          | 11.8                      | 294        | 74.3          | 3.6                | 6          |
| 20          | 11.8                      | 348        | 77.3          | 3.3                | 14         | 11.2                      | 400        | 79.5          | 2.9                | 12         | 11.3                      | 280        | 75.7          | 4.0                | 19         |
| 21          | 14.6                      | 335        | 77.0          | 3.3                | 8          | 12.4                      | 345        | 78.2          | 3.0                | 11         | 12.3                      | 240        | 76.3          | 4.0                | 10         |
| 22          | 13.1                      | 300        | 75.7          | 3.1                | 7          | 12.9                      | 317        | 79.1          | 2.4                | 3          | 12.1                      | 247        | 77.5          | 3.9                | 13         |
| 23          | 13.0                      | 371        | 77.6          | 2.9                | 29         | 12.0                      | 332        | 79.3          | 2.3                | 17         | 11.6                      | 257        | 77.1          | 4.0                | 24         |
| 24          | 13.6                      | 358        | 75.6          | 3.0                | 46         | 11.6                      | 330        | 78.3          | 3.0                | 28         | 11.7                      | 252        | 77.5          | 3.8                | 38         |
| 25          | 13.4                      | 308        | 76.9          | 2.9                | 29         | 11.8                      | 294        | 77.2          | 3.9                | 31         | 11.4                      | 287        | 75.8          | 3.9                | 29         |
| 26          | 14.6                      | 318        | 76.8          | 2.9                | 26         | 11.9                      | 341        | 78.8          | 3.4                | 27         | 11.8                      | 288        | 76.9          | 4.0                | 16         |
| 27          | 14.6                      | 364        | 77.6          | 2.6                | 13         | 12.0                      | 302        | 77.7          | 3.5                | 11         | 11.6                      | 298        | 77.3          | 3.7                | 14         |
| 28          | 14.9                      | 339        | 77.0          | 2.6                | 36         | 12.1                      | 302        | 77.2          | 3.7                | 47         | 11.2                      | 323        | 78.0          | 3.7                | 25         |
| 29          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | 11.8                      | 351        | 79.3          | 3.5                | 5          |
| 30          | 13.3                      | 334        | 78.9          | 2.6                | 6          | 13.3                      | 318        | 76.8          | 2.6                | 6          | 12.4                      | 317        | 78.8          | 3.3                | 4          |
| 31          | -                         | -          | -             | -                  | -          | -                         | -          | -             | -                  | -          | 12.5                      | 393        | 78.3          | 3.6                | 2          |
| 32          | 12.7                      | 414        | 80.9          | 2.1                | 3          | -                         | -          | -             | -                  | -          | 12.8                      | 258        | 80.3          | 2.7                | 3          |
| 33          | 12.4                      | 439        | 79.4          | 2.7                | 5          | -                         | -          | -             | -                  | -          | 11.9                      | 348        | 77.1          | 3.2                | 4          |
| 34          | 14.0                      | 397        | 77.0          | 2.7                | 6          | 12.2                      | 366        | 80.1          | 2.8                | 1          | 11.0                      | 239        | 77.4          | 4.0                | 4          |
| 35          | 13.1                      | 386        | 77.0          | 3.0                | 19         | 11.8                      | 378        | 80.7          | 2.2                | 4          | 12.1                      | 284        | 77.1          | 2.6                | 20         |
| 36          | 12.8                      | 395        | 77.8          | 3.1                | 8          | 12.7                      | 404        | 79.9          | 2.6                | 8          | -                         | -          | -             | -                  | -          |
| <b>Ave.</b> | <b>12.9</b>               | <b>364</b> | <b>77.2</b>   | <b>2.8</b>         | <b>472</b> | <b>11.6</b>               | <b>349</b> | <b>78.6</b>   | <b>2.9</b>         | <b>480</b> | <b>11.9</b>               | <b>308</b> | <b>77.1</b>   | <b>3.4</b>         | <b>480</b> |

## BREAD WHEAT GRADING TABLE 2003/2004

| Grade                           | Minimum             |                         |                        | Maximum percentage permissible deviation (m/m) |             |               |                |                                 |                                |                       |                      |                        |                               |
|---------------------------------|---------------------|-------------------------|------------------------|--|-------------|---------------|----------------|---------------------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------------------|
|                                 |                     |                         |                        | A  | B           | C             | D              | E                               | F                              | G                     | H                    | I                      | J                             |
|                                 | Hectolitre mass, kg | Falling number, seconds | Protein content, %     | Heavily frost damaged kernels                  | Field fungi | Storage fungi | Screenings     | Other grain and unthreshed ears | Gravel, stones, turf and glass | 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           | 3              | 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 | 25 g sifted   | 500 g unsifted | 50 g sifted                     | 100 g sifted                   | 100 g sifted          | 100 g sifted         | 25 g sifted            | -                             |

### SCHEMATIC PRESENTATION OF CLASSES AND GRADES OF WHEAT

#### BREAD WHEAT

#### BISCUIT WHEAT

#### DURUM WHEAT

##### Class B

##### Class C

##### Class D

##### Grade

##### Grade

##### Grade

|                        |               |                  |               |               |                       |               |              |                  |
|------------------------|---------------|------------------|---------------|---------------|-----------------------|---------------|--------------|------------------|
| Minimum Prot (12 % mb) | Minimum kg/hl | FN Minimum 220 s | Minimum kg/hl | No minimum FN | Minimum Prot (12% mb) | Minimum kg/hl | Minimum % vk | FN Minimum 220 s |
| 12                     | 77            | <b>B1</b>        | 76            | <b>C1</b>     | 14                    | 79            | 90           | <b>DS</b>        |
| 11                     | 76            | <b>B2</b>        | 74            | <b>C2</b>     | 13                    | 76            | 80           | <b>D1</b>        |
| 10                     | 74            | <b>B3</b>        |               |               | 12                    | 74            | 70           | <b>D2</b>        |
|                        |               | FN Minimum 200 s |               |               |                       |               |              |                  |
| 9                      | 72            | <b>B4</b>        |               |               |                       |               |              |                  |
|                        |               | FN Minimum 150 s |               |               |                       |               |              |                  |
| 8                      | 70            | <b>UT</b>        |               |               |                       |               |              |                  |

#### **CLASS OTHER WHEAT**

Does not comply with the minimum requirements for UT or C2 or D2.

FN = falling number  
mb = moisture basis  
vk = vitreous kernels

# METHODS

## **GRADING:**

Full grading was done in accordance with the Regulations relating to the grading, packing and marking of wheat intended for sale in the Republic of South Africa (No. R. 905 of 10 July 1998 as amended by Nos R. 1421 of 6 November 1998 and R. 876 of 14 September 2001).

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

**Thousand kernel mass** 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.

**Sprouted kernels** are wheat kernels in which germination has proceeded to such an extent that the skin that covers the embryo has been broken or the developing rootlets are clearly visible.

**Field fungi** infected kernels refer to wheat kernels that are visibly infected with fungi, and that

- have greyish brush ends; or
- have a dull, lifeless, chalky or pinkish and shrunken appearance as a result of Fusarium infection.

## **PROTEIN:**

The Dumas combustion analysis technique is used, according to AACC method 46-30, 1999. This method prescribes a generic combustion method for the determination of crude protein. Combustion at high temperature in pure oxygen sets nitrogen free, which is measured by thermal conductivity detection. The total nitrogen content of the flour sample is determined and converted to equivalent protein by multiplication with a factor of 5.7 to obtain the protein content.

## **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 alpha-amylase activity. ICC Standard No.107/1, 1995 is used to determine the falling number. Only the altitude-corrected value is reported.

## **MIXOGRAPH:**

A 35 g mixograph is used. The amount of water added to the flour is adjusted according to the flour protein content. AACC method 54-40A, 1999 is followed.

**Mixogram Peak Time** is the time measured in minutes that a 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.

## **MILLING:**

Cleaned wheat samples are damped to between 15,0 % and 16,0 % moisture according to the wheat moisture and kernel hardness and allowed to stand for 20 hours. Samples are then milled on a standard Bühler MLU 202 mill and passed through a bran finisher.

## **BÜHLER EXTRACTION:**

The extraction represents the flour yield after milling. Flour extraction is calculated from the mass of the total products. Bühler MLU 202 mill set for South African wheat, mill settings and sieve sizes deviate from AACC method 26-10, 1999.

## **COLOUR:**

The Kent Jones colour is determined by following FTP Method No. 0007/3, 7/1991. This method determines the influence of the branny material present in flour by measuring reflectance with a light source in the green band of the light spectrum. The lower the Kent Jones colour, the brighter the flour.

## **FARINOGRAPH:**

AACC method 54-21, 1999 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. The dough is subjected to a prolonged, relatively gentle mixing action at a constant temperature.

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** is the time from the beginning of water addition till 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 that have a high percentage of gluten-forming proteins.

The **stability** 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 value** is the difference, in Brabender units, 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:**

ICC Standard No. 114/1, 1992 is followed.

The **strength** 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** 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** is the mean length at the base of the 2 curves and indicates the stretchability of the dough.

## **ALVEOGRAPH:**

ICC Standard No.121,1992 is followed.

The **Alveograph** measures the resistance of the dough to stretching and also how extensible the dough is. The **Alveo** stretches the dough in more than one direction (as is happening during proofing), whereas the Extensograph stretches the dough in only one direction.

**Strength:** The area under the curve gives an indication of the dough strength.

**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.

**Distensibility (L):** The length of the curve, measured along the base line, gives an indication of the extensibility of the dough and also predicts the handling characteristics 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.

## **100 g BAKING TEST:**

This procedure, according to AACC Method 10-10B, 1999, 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 characteristic 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 per se, but refers to the relationship between the protein content and the bread volume.

## MYCOTOXIN ANALYSES

The pathogenic nature of certain species of fungi to plants has been observed virtually since the beginning of agriculture. These plant pathogens can produce metabolites (mycotoxins) that show toxic effects when they are ingested.

The mycotoxin analyses were carried out in accordance with the Vicam immunoaffinity

column technique using the different Vicam Instruction Manuals for the different mycotoxins. Detection of the toxins was done on a Fluorometer. 30 samples of the 472 wheat crop samples were tested for Aflatoxin, Fumonisin, Deoxynivalenol, Zearalenone, T-2 Toxin and Ochratoxin.

| <b>Fungi</b>   | <b>Toxin</b>         | <b>Method reference</b>                          |
|--|----------------------|--|
| <i>Aspergillus flavus</i>  | Aflatoxin            | Vicam Aflatest Instruction Manual May 5, 1999    |
| <i>Aspergillus ochraceus</i> and several species of <i>Penicillium sp.</i>             | Ochratoxin           | Vicam Ochratest Instruction Manual May 4, 1999   |
| <i>Fusarium moniliforme</i>  | Fumonisin            | Vicam Fumonitest Instruction Manual Nov 15, 2002 |
| <i>Fusarium graminearum</i>  | Zearalenone          | Vicam Zearalatest Instruction Manual Nov19, 1998 |
| <i>Fusarium graminearum</i>  | Deoxynivalenol (DON) | Vicam DONtest TAG Instruction Manual Apr 4, 2000 |
| <i>Fusarium sporotrichioides</i><br><i>Fusarium poae</i><br><i>Fusarium tricinctum</i> | T-2                  | Vicam T-2 TAG Instruction Manual Apr 25, 2000    |