

SOUTH AFRICAN

Wheat Crop Quality Report 2003/2004 Season

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SOUTH AFRICAN COMMERCIAL WHEAT QUALITY 2003/2004 CROP

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Introduction

As a result of the low production during the 2003/2004 season, the 5-year average South Africa's wheat production is now 2,085 million tons per year.

The Western Cape province produced 487 500 tons and the Free State province followed with 455 000 tons. (Final estimation of the Crop Estimates Committee CEC). These two provinces accounted for 66 % of the total wheat production.

The low production (38 % lower than the previous season) can be contributed to the drought in the Free State and the water restrictions in the irrigation areas in Mpumalanga, which led to less planting. The drought in the Swartland area in the Western Cape nearly halved the production in that province.

Irrigation wheat contributed more to the total crop this year because of the drought experienced in the Free State and especially in the Swartland area. The estimated area of wheat under irrigation is approximately 112 500 ha (15,0 %) with an estimated yield of 5,20 t/ha, and for dry land 635 500 ha (85,0 %) with an estimated yield of 1,50 t/ha.

The production is not enough for inland requirements, and South Africa has to import wheat to meet domestic consumption of approximately 2,684 million tons this year.

South Africa has three major and two smaller 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 are also the official grain quality reference laboratory in Southern Africa.

Crop quality

The final production figures was 1,540 million tons (including 33 000 tons retained on farms) with an average yield of 2,06 tons per hectare. 748 000 ha of wheat were planted (Crop Estimates Committee - CEC and Crop Estimates Liaison Committee - CELC).

The quality of this crop gave low hectolitre masses and high protein because of the dry weather conditions during 2003.

Every year representative wheat crop quality samples are taken by commercial grain silo owners and sent to the SAGL for the annual crop quality survey.

Changes to the Grading Regulation this season resulted in having five bread wheat grades mainly as a result of the protein content and hectolitre mass.

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.

Cultivar identification is done on these samples and figures of seed sold by the commercial grain silo owners are also gathered

Composite samples are made up per grade per region and milled on the Bühler mill. A farinograph, extensograph, alveograph, mixograph and baking test are then performed.

QUALITY 2003 / 2004

Grain quality

Full grading was done and the physical grain quality was not as good as the previous year because of the dry weather conditions during this season.

The hectolitre mass averaged 77,2 kg/hl (78,6 kg/hl last season). The average thousand kernel mass was 33,5 g (13 % mb) (35,4 g the previous season). The irrigation areas gave an average thousand kernel mass of 36,8 g while the Free State area gave the lowest average thousand kernel mass of 32,0 g.

The protein average was 12,9 % (12 % mb) (11,6% the previous season) with all the regions giving averages between 10,7 % (normal weather conditions) to 14,9 % (drought-stricken area).

No falling number problems or any other abnormalities in the other grading factors were experienced.

The average milling extraction in the laboratory on the Bühler MLU 202 was 74,2 %. On average the extraction percentage of the grade 1 bread wheat was about 1% higher than the average extraction percentage of the grade 4 bread wheat. The Western Cape gave an average extraction on grade 1 of 74,5 % and the Free State 74,4 %. Higher average extractions were obtained from the grade 1 irrigation wheat (75,3 %) and other summer rainfall areas (75,8 %). (Please note that the Bühler laboratory mill usually gives approximately 2% less extraction than can be obtained commercially.)

The average screenings through a 1,8 mm screen were 2,0 % (1,35 % the previous season) with the highest average percentage of 2,47 in the Western Cape and the lowest average percentage of 1,89 in the Irrigation areas.

Dough quality

The dough properties are typical of South African wheat.

The flour colour averaged a good -0,8 KJ units with the flour of the irrigation wheat giving the whitest average colour of -1,2 KJ units.

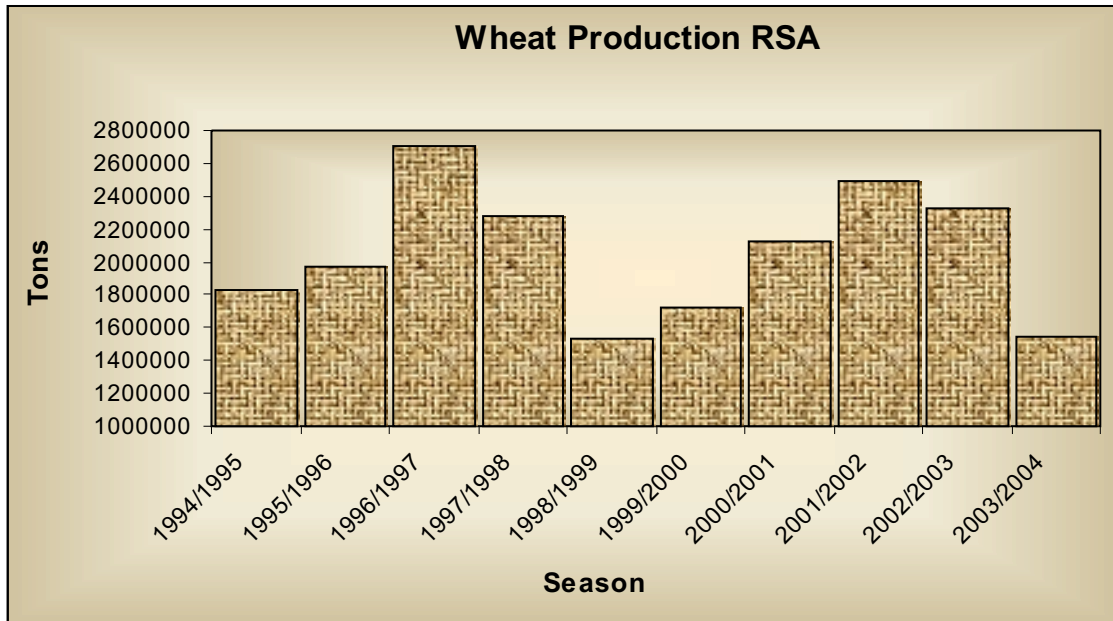
The mixogram peak time (quadromat) averaged 2,8 minutes (2,9 minutes the previous season) with the wheat from the other summer rainfall areas and the Free State having the longest peak times and averaging 2,9 minutes and the wheat from the irrigation areas averaging 2,6 minutes. This average mixogram peak time (2,8 minutes) is more or less in line with the 10-year average.

The average farinogram water absorption for grade 1 wheat was 62,3 %. The Western Cape grade 1 wheat averaged 61,1 %, Free State grade 1 wheat 62,8 % while the grade 1 wheat from the irrigation areas and the other summer rainfall areas gave averages of 62,2 % and 63,0 % water absorption respectively. On average the farinogram water absorption percentage of the grade 1 bread wheat was about 2 % higher than the average water absorption of the grade 4 bread wheat. The average farinograph development time of all the grades was 4,2 minutes and stability was 6,4 minutes.

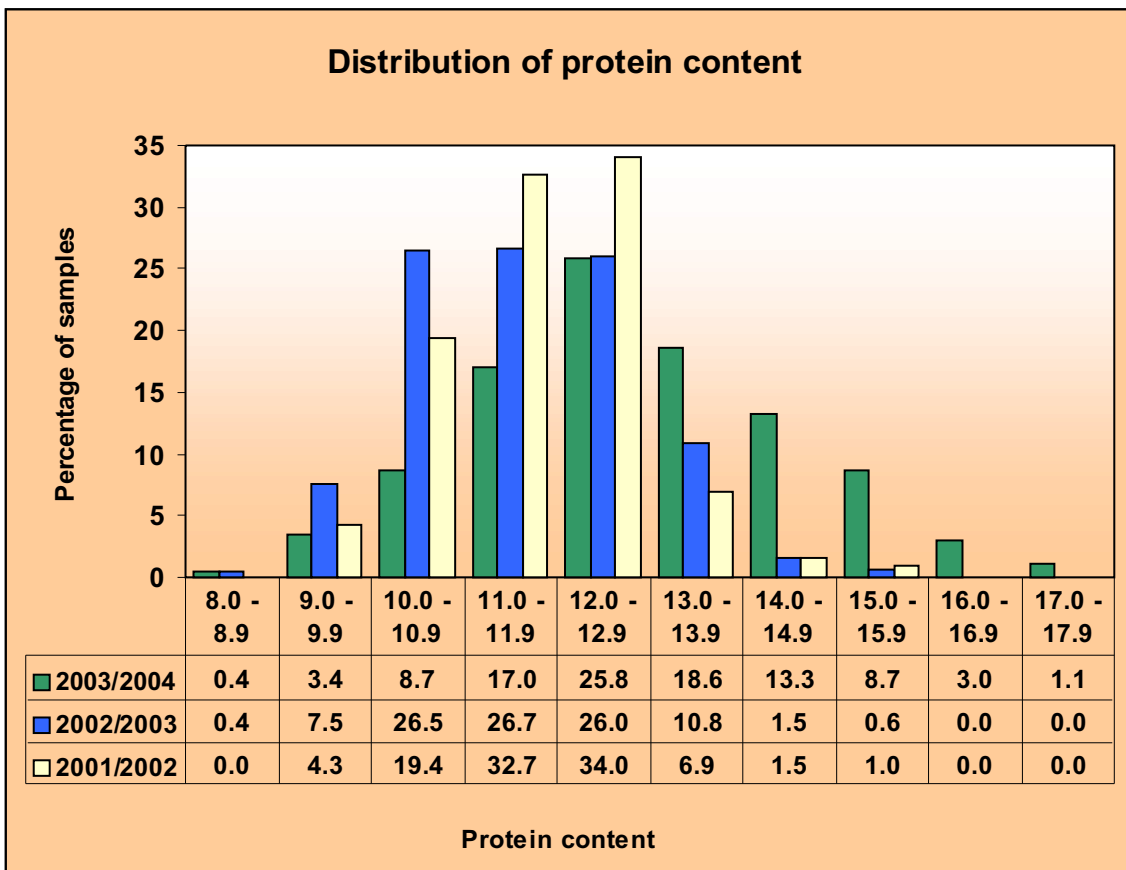
The baking tests showed a very good relationship between protein content and bread volume. The irrigation wheat showed an excellent relationship.

Alveogram strengths were good while the extensograph extensibility were a little bit short.

WHEAT PRODUCTION IN THE RSA OVER THE LAST 10 SEASONS



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



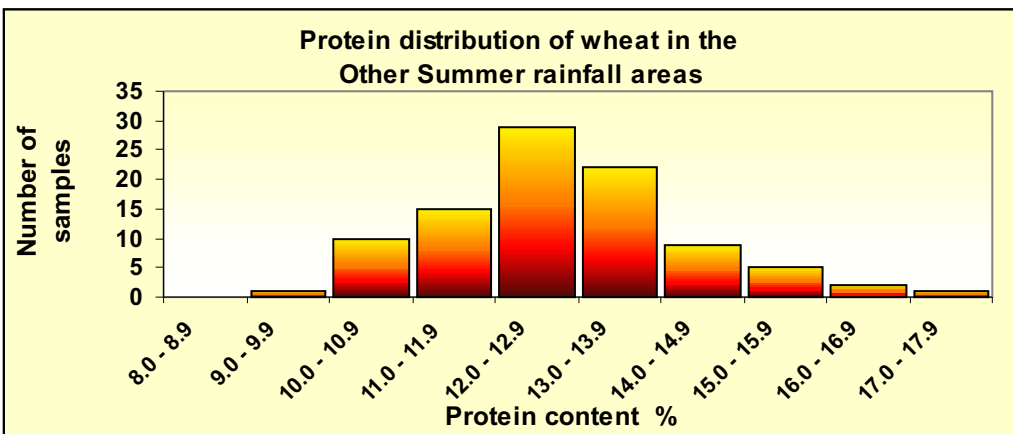
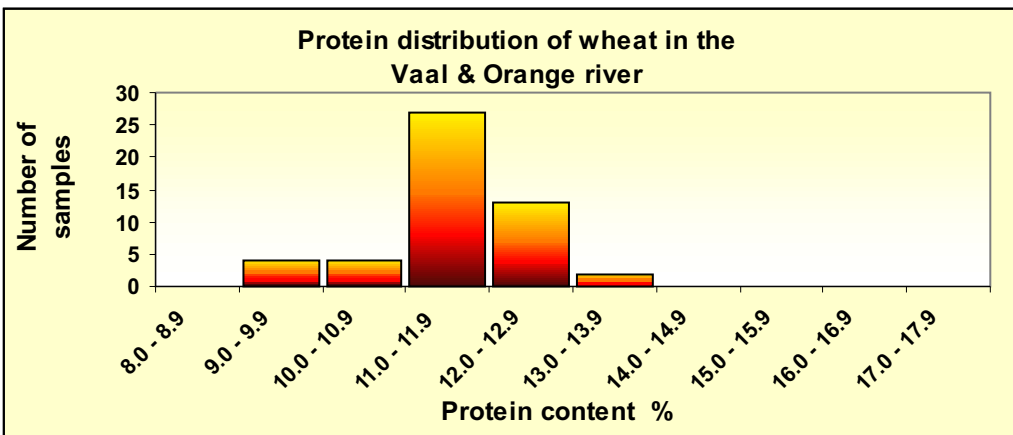
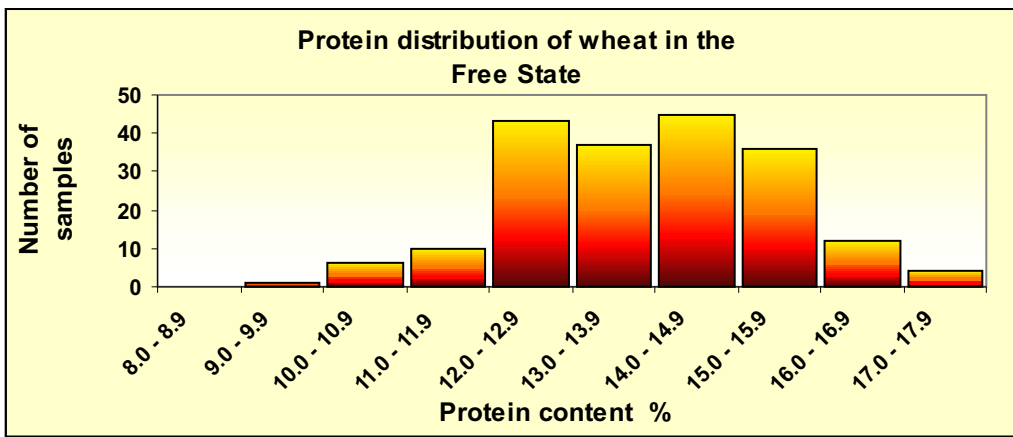
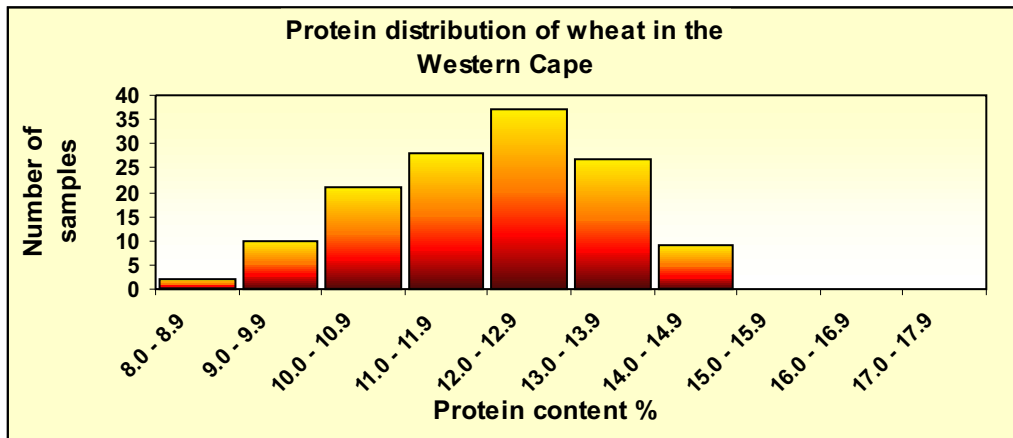
REGIONAL QUALITY WEIGHTED AVERAGES

| | <i>Western Cape Province</i> | | <i>Free State Province</i> | | <i>Vaal & Oranje river area</i> | | <i>Other Summer rainfall areas</i> | | <i>RSA average</i> | |
|--|--------------------------------------|-----------|--------------------------------|-----------|---|-----------|--|-----------|------------------------|-----------|
| <i>Individual samples n</i> | 134 | | 194 | | 50 | | 94 | | 472 | |
| Regions | 1 to 6 | | 21 to 28 | | 10 and 11 | | 12,14 to 20, 30 to 36 | | All | |
| Hectolitre mass dirty, kg/hl | 77,5 | | 76,7 | | 78,0 | | 77,5 | | 77,2 | |
| 1000 kernel mass (13 % mb), g | 32,4 | | 32,0 | | 36,8 | | 36,3 | | 33,5 | |
| Falling number, sec | 392 | | 340 | | 357 | | 377 | | 364 | |
| Screenings (1,8 mm), % | 2,47 | | 2,03 | | 1,89 | | 2,00 | | 2,01 | |
| Protein (12 % mb), % | 11,98 | | 13,94 | | 11,60 | | 12,79 | | 12,91 | |
| Mixogram peak time, min (Quadromat) | 2,7 | | 2,9 | | 2,6 | | 2,9 | | 2,8 | |
| Composite samples per grade n = 80 | B1 | B2 | B1 | B2 | B1 | B2 | B1 | B2 | B1 | B2 |
| | B3 | B4 | B3 | B4 | B3 | B4 | B3 | B4 | B3 | B4 |
| Bühler extraction, % | 74,5 | 74,1 | 74,4 | 73,9 | 75,3 | 75,6 | 75,8 | 75,1 | 74,8 | 74,4 |
| | 73,7 | 72,8 | 73,7 | 72,8 | 75,1 | 75,0 | 74,6 | 76,0 | 74,0 | 73,6 |
| Flour colour, KJ | -1,0 | -1,2 | 0,2 | -0,6 | -1,1 | -1,3 | -0,4 | -0,6 | -0,6 | -0,9 |
| | -1,0 | -0,8 | -0,2 | 0,0 | -1,2 | -1,1 | -0,3 | -1,0 | -0,7 | -0,7 |
| Farinogram: Water absorption, % | 61,1 | 60,5 | 62,8 | 62,2 | 62,2 | 61,6 | 63,0 | 61,5 | 62,3 | 61,5 |
| | 60,0 | 59,4 | 62,4 | 62,9 | 61,3 | 61,5 | 59,9 | 58,2 | 60,9 | 60,5 |
| Farinogram: Development time, min | 4,3 | 4,1 | 5,1 | 5,2 | 4,0 | 3,9 | 4,8 | 4,9 | 4,6 | 4,5 |
| | 3,9 | 3,5 | 5,3 | 5,8 | 3,4 | 3,0 | 3,9 | 2,3 | 4,1 | 3,7 |
| Farinogram: Stability, min | 6,0 | 5,8 | 7,1 | 8,4 | 5,4 | 5,6 | 6,9 | 7,0 | 6,4 | 6,7 |
| | 5,8 | 6,1 | 8,2 | 8,4 | 4,9 | 4,4 | 6,8 | 4,9 | 6,4 | 6,0 |
| Relationship between protein and bread volume | VG | Ex | Ex | VG | Ex | Ex | VG | Ex | Very good | |
| | VG | VG | G | G | Ex | Ex | Ex | Ex | | |
| Alveogram: Strength cm² | 39,1 | 32,7 | 48,4 | 49,5 | 38,0 | 33,2 | 43,5 | 43,4 | 42,3 | 39,7 |
| | 33,3 | 33,4 | 50,4 | 51,8 | 31,5 | 27,8 | 35,6 | 28,0 | 37,7 | 35,3 |
| Extensogram: Extensibility, cm | 17,8 | 16,3 | 19,3 | 18,8 | 17,8 | 15,8 | 19,9 | 18,3 | 18,7 | 17,3 |
| | 15,9 | 15,9 | 20,0 | 20,3 | 15,5 | 14,8 | 17,6 | 15,0 | 17,3 | 16,5 |

Ex = Excellent

VG = Very Good

G = Good



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. Normal weather conditions prevailed in the Rûens area while drought resulted in a very low production in the Swartland area.

The final crop production estimation in the Western Cape was 487 500 tons (CEC), which is 48% lower than last year's production. The thousand kernel mass averaged 32,4 g (same as the wheat from the Free State, but less than the other summer rainfall and irrigation areas (36,5 g). Screenings on a 1,8 mm sieve averaged 2,47 %.

The protein averaged 12,0 % (12 % mb) which is higher than the previous season (11,2 %). The protein of the south-easterly planting area (Rûens) was much lower (10,8 %) than the drought-stricken western planting area (12,6 %).

The hectolitre mass averaged 77,5 kg/hl (78,5 kg/hl last season). The falling numbers were good (average of 392 seconds).

Mixogram peak time (wheat milled on quadromat) averaged 2,7 minutes (2,8 minutes the previous season).

Flour extraction averaged 73,8 %, which is 2,5 % lower than the previous season's 76,3 %. The extraction compares on average to the Free State but is about 1,5 % lower than the wheat from the other summer rainfall areas and irrigation areas.

The flour colour averaged -1,0 KJ units. Dough quality was good, with average water absorption (60,3 %), development time (4,0 minutes) and stability (5,9 minutes).

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

The alveogram strength gave a good average of 34,6 cm² with the strength increasing from 33,4 cm² (grade 4 wheat) to 39,1 cm² (grade 1 wheat).

SUMMER RAINFALL AREA

(Free State)

Production regions 21 to 28 fall within the Free State province and were estimated to have a production of 455 000 tons (CEC). This is 40 % less than the previous year as a result of a drought. The thousand kernel mass averaged 32,0 g. The average screenings (1,8 mm sieve) were 2,03 %.

The protein averaged an abnormal high of 13,9 % because of the dry conditions. The average protein content in the northern and central Free State areas was slightly lower (13,6 %) than in the south-western and eastern Free State (14,3 %). The hectolitre mass averaged 76,7 kg/hl and was 1,2 kg/hl lower than the previous year.

The falling number values averaged 340 seconds.

Flour extraction (average 73,7 %) was about 2,4 % lower than the previous year.

The mixogram peak time (quadromat) decreased (average 2,9 minutes) this season, against 3,4 minutes the previous season and 3,9 during 2001/2002.

The flour colour averaged -0,2 KJ units. Dough quality was good, with water absorption averaging 62,6 % (62,9 % during 2002/2003), development time 5,4 minutes (4,0 minutes the previous season) and stability 8,0 minutes (6,6 minutes during 2002/2003).

The wheat from the summer rainfall area had very strong alveogram strengths averaging 50,0 cm².

SUMMER RAINFALL AREA

(Eastern Cape, North West, Mpumalanga, Gauteng, Limpopo and KwaZulu-Natal)

This includes regions 12, 14 to 20, 30 to 36. The estimated crop production for these regions was 234 100 tons (CEC), which is 34 % lower than last year's production.

The thousand kernel mass averaged 36,3 g (39,0 the previous season), which is about 4 g higher than that of the Western Cape and the Free State.

The average protein content was 12,8 % (1 % higher than the previous season). The hectolitre mass averaged 77,5 kg/hl (79,8 kg/hl in 2002/2003). The average falling number value was 377 seconds.

Flour extraction averaged 75,4 % against 78,4 % the previous season. This is mainly a result of the smaller / thinner kernels due to dry conditions.

The mixogram peak time (quadromat) average was 2,9 minutes (2,3 the previous season).

The flour colour averaged -0,6 KJ units. The water absorption on the farinograph averaged 60,7 % (64,5 % the previous season), development time 4,0 minutes (4,2 minutes the previous season) and stability 6,4 minutes (5,2 minutes the previous season).

The relationship between protein content and bread volume was excellent.

This area gave a good average alveogram strength of 37,6 cm². The strength also increased from 28,0 cm² (grade 4 wheat) to 43,5 cm² (grade 1 wheat).

IRRIGATION AREA

(Vaal and Orange Rivers)

The majority of irrigation intake silos are in regions 10 and 11, with an estimated crop production of 251 550 tons (CEC), which is 8 % lower than the previous year. Irrigation wheat is also produced in some dryland areas such as North West, Limpopo, Mpumalanga, Free State, Eastern Cape, Gauteng and KwaZulu-Natal.

The thousand kernel mass averaged 36,8 g (compared with 39,9 g last year), which is about 4,6 g better than the wheat of the Western Cape and Free State areas.

The protein averaged 11,60 %, which is the same than the previous year. The falling number averaged 357 seconds. The hectolitre mass average was 78,0 kg/hl (80,1 kg/hl during 2002/2003), the highest of all areas.

Büchler flour extraction had an average of 75,3 %, which is 2,9 % less than the previous season (78,2 %).

The mixogram peak time (quadromat) averaged 2,6 minutes (2,1 minutes during 2002/2003).

The flour from this area gave the brightest average colour of -1,2 KJ units. The relationship between protein content and bread volume was excellent. The farinograph water absorption averaged 61,7 % (64,4 % during 2002/2003), development time 3,6 minutes (4,0 minutes the previous season) and stability 5,1 minutes (4,7 minutes the previous season).

The alveogram strength was on average the lowest (32,6 cm²) of the four production areas discussed. The strength increased from grade 4 wheat (27,8 cm²) to grade 1 wheat (38,0 cm²).

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

| PRODUCTION REGION | (1) | (2) | (3) |
|----------------------------------|---|---|--|
| | Namakwaland | Swartland Western Region | Swartland Central Region |
| Intake silos | Bitterfontein Graafwater Landplaas Vanrhynsdorp Vredendal | Bergrivier Darling Koperfontein Vredenburg | Eendekuil Klipheuwel Koringberg Malmesbury Moorreesburg Moravia Piketberg Pools Ruststasie |
| WHEAT | | | |
| Protein (12%mb), % | 11.49 | 12.97 | 13.03 |
| Falling number, sec | 406 | 407 | 393 |
| 1000 Kernel mass (13%mb), g | 36.4 | 28.6 | 28.2 |
| Hectolitre mass (dirty), kg/hl | 76.3 | 75.3 | 75.8 |
| Screenings (<1.8mm), % | 1.52 | 3.77 | 2.80 |
| Sprouted kernels, % | 0.00 | 0.00 | 0.00 |
| Number of samples | 4 | 24 | 36 |
| CULTIVARS | | | |
| SST 94 | 33.2 | 7.8 | 11.3 |
| SST 57 | 27.8 | 14.2 | 14.7 |
| with highest % occurrence | SST 88 SST 825 | 22.5 12.0 | 61.0 0.3 |
| SST 65 | 4.5 | 11.8 | 12.0 |
| Number of samples | 4 | 24 | 36 |
| MIXOGRAM (Quadromat) | | | |
| Peak time, min | 2.9 | 2.9 | 2.8 |
| Tail height (6min), mm | 51 | 51 | 52 |
| Number of samples | 4 | 24 | 36 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 |
| BÜHLER EXTRACTION, % | 74.7 74.4 74.3 72.0 | 73.7 72.5 72.9 70.6 | 74.5 72.8 72.0 72.4 |
| FLOUR | | | |
| Protein (12%mb), % | 13.1 10.5 10.0 9.4 | 12.3 12.2 12.9 13.2 | 12.1 11.1 12.9 13.7 |
| Colour, KJ | -0.4 -1.3 -1.2 -1.3 | -1.0 -0.8 -0.4 1.0 | -1.0 -1.2 -0.9 -0.6 |
| FARINOGRAM | | | |
| Water absorption (14%mb), % | 62.9 62.0 60.6 57.7 | 59.5 59.2 60.1 59.7 | 59.6 59.3 59.8 61.3 |
| Development time, min | 4.2 3.8 3.5 2.3 | 4.5 4.8 4.3 5.3 | 3.8 3.8 4.7 5.2 |
| Stability, min | 5.9 4.9 5.1 5.1 | 7.2 7.2 7.0 8.8 | 6.1 6.2 7.7 8.4 |
| Mixing Tolerance Index, BU | 55 60 58 61 | 46 48 46 33 | 50 55 42 40 |
| EXTENSOGRAM (45 min pull) | | | |
| Area, cm2 | 82 66 67 56 | 108 119 114 122 | 107 102 103 110 |
| Maximum height, BU | 310 305 315 290 | 390 440 395 420 | 385 375 390 370 |
| Extensibility, cm | 18.2 14.7 14.6 13.6 | 19.1 19.1 19.6 19.2 | 19.0 18.1 18.4 20.4 |
| ALVEOGRAM | | | |
| Strength, cm2 | 36.1 28.1 30.6 24.3 | 43.7 42.4 43.7 46.8 | 44.3 37.2 45.3 48.5 |
| Stability (P), mm | 82 95 90 73 | 80 78 79 79 | 77 77 77 82 |
| Distensibility (L), mm | 103 58 75 71 | 130 133 140 146 | 152 117 151 147 |
| Configuration ratio (P/L) | 0.79 1.62 1.21 1.03 | 0.62 0.58 0.56 0.54 | 0.51 0.66 0.51 0.56 |
| MIXOGRAM | | | |
| Peak time, min | 2.0 2.0 2.5 2.7 | 2.5 2.5 2.5 2.8 | 2.3 2.7 2.2 2.5 |
| 100g BAKING TEST | | | |
| Loaf volume, cm3 | 945 805 780 745 | 940 925 945 940 | 1000 930 1035 1070 |
| Evaluation | 2 1 1 1 | 0 0 1 2 | 0 0 0 0 |

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

| PRODUCTION REGION | (4) | | | | (5) | | | | (6) | | | |
|-------------------------------------|--|------------|------------|------------|--|------------|------------|------------|--|------------|------------|------------|
| | Swartland Eastern Region | | | | Ruens Western Region | | | | Ruens Eastern Region | | | |
| Intake silos | Ceres Gouda Halfmanshof Leliedam Porterville Riebeeck-Wes | | | | Bredasdorp Caledon Klipdale Krige Napier Protém Rietpoel Villiersdorp | | | | Albertinia Ashton Camfer Heidelberg Karringmelksrivier Kleinberg Protém Riversdal Swellendam | | | |
| WHEAT | | | | | | | | | | | | |
| Protein (12% mb), % | 11.88 | | | | 10.76 | | | | 10.74 | | | |
| Falling number, sec | 384 | | | | 387 | | | | 386 | | | |
| 1000 Kernel mass (13% mb), g | 30.2 | | | | 38.3 | | | | 38.1 | | | |
| Hectolitre mass (dirty), kg/hl | 77.2 | | | | 80.7 | | | | 79.3 | | | |
| Screenings (<1.8mm), % | 1.61 | | | | 2.28 | | | | 1.66 | | | |
| Sprouted kernels, % | 0.00 | | | | 0.00 | | | | 0.00 | | | |
| Number of samples | 23 | | | | 30 | | | | 17 | | | |
| CULTIVARS | | | | | | | | | | | | |
| cultivars with highest % occurrence | SST 88 | 51.6 | | | 39.0 | | | 19.6 | | | | |
| | SST 57 | 22.5 | | | 25.5 | | | 35.6 | | | | |
| | SST 94 | 11.9 | | | 22.5 | | | 29.5 | | | | |
| | SST 65 | 9.8 | | | 8.9 | | | 6.5 | | | | |
| | SST 825 | 0.3 | | | 0.7 | | | 5.6 | | | | |
| Number of samples | 23 | | | | 30 | | | | 17 | | | |
| MIXOGRAM (Quadromat) | | | | | | | | | | | | |
| Peak time, min | 2.7 | | | | 2.3 | | | | 2.8 | | | |
| Tail height (6min), mm | 49 | | | | 46 | | | | 49 | | | |
| Number of samples | 23 | | | | 30 | | | | 17 | | | |
| | B 1 | B 2 | B 3 | B 4 | B 1 | B 2 | B 3 | B 4 | B 1 | B 2 | B 3 | B 4 |
| BÜHLER EXTRACTION, % | 74.4 | 74.4 | 73.4 | 71.9 | 75.0 | 75.0 | 75.3 | 75.9 | 74.9 | 75.3 | 74.5 | 74.0 |
| FLOUR | | | | | | | | | | | | |
| Protein (12% mb), % | 11.4 | 10.6 | 10.3 | 11.3 | 11.4 | 10.1 | 9.6 | 8.7 | 12.3 | 10.7 | 9.6 | 8.7 |
| 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 |
| FARINOGRAM | | | | | | | | | | | | |
| Water absorption (14% mb), % | 60.1 | 59.3 | 58.6 | 58.8 | 62.5 | 61.1 | 60.9 | 61.8 | 62.1 | 62.3 | 59.7 | 56.9 |
| Development time, min | 4.0 | 4.3 | 3.7 | 4.2 | 3.8 | 3.5 | 3.3 | 1.8 | 5.2 | 4.2 | 3.8 | 2.0 |
| Stability, min | 5.5 | 6.0 | 5.0 | 5.3 | 3.8 | 4.8 | 4.8 | 4.0 | 7.2 | 5.8 | 5.1 | 5.2 |
| Mixing Tolerance Index, BU | 57 | 61 | 65 | 60 | 66 | 76 | 69 | 67 | 51 | 64 | 74 | 66 |
| EXTENSOGRAM (45 min pull) | | | | | | | | | | | | |
| Area, cm2 | 101 | 78 | 66 | 85 | 70 | 52 | 42 | 42 | 84 | 62 | 56 | 60 |
| Maximum height, BU | 445 | 335 | 315 | 330 | 270 | 220 | 215 | 240 | 335 | 270 | 265 | 335 |
| Extensibility, cm | 15.5 | 15.9 | 14.4 | 17.8 | 17.4 | 14.6 | 13.3 | 11.8 | 17.5 | 15.5 | 14.8 | 12.6 |
| ALVEOGRAM | | | | | | | | | | | | |
| Strength, cm2 | 39.9 | 35.0 | 30.4 | 34.3 | 29.7 | 24.5 | 24.0 | 22.8 | 41.0 | 28.7 | 26.0 | 23.7 |
| Stability (P), mm | 79 | 76 | 75 | 68 | 79 | 78 | 82 | 95 | 87 | 91 | 80 | 72 |
| Distensibility (L), mm | 128 | 115 | 95 | 138 | 88 | 72 | 64 | 45 | 107 | 65 | 69 | 70 |
| Configuration ratio (P/L) | 0.62 | 0.66 | 0.79 | 0.50 | 0.90 | 1.09 | 1.27 | 2.08 | 0.81 | 1.39 | 1.17 | 1.03 |
| MIXOGRAM | | | | | | | | | | | | |
| Peak time, min | 2.4 | 2.3 | 2.4 | 2.3 | 2.0 | 1.9 | 2.3 | 2.0 | 2.4 | 2.3 | 2.1 | 3.2 |
| 100g BAKING TEST | | | | | | | | | | | | |
| Loaf volume, cm3 | 935 | 860 | 905 | 940 | 865 | 830 | 760 | 680 | 885 | 820 | 785 | 705 |
| Evaluation | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 1 | 0 | 1 |

SOUTH AFRICAN

IRRIGATION WHEAT

Vaal and Orange river area

SUMMER RAINFALL WHEAT (AND IRRIGATION)

North-West Province

| PRODUCTION REGION | (10) Griekwaland - West | (11) Vaalharts | (12) North-West Western Region | (14) North-West Southern Region | (16) North-West Central Eastern Region |
|-----------------------------------|---|---|---|--|--|
| Intake silos | Britstown Douglas Marydale Modderrivier Oranjerivierstasie Prieska Rietrivier Upington | Barkly-Wes Hartswater Jan Kemp Magogong Taung | Bloubank Buhmannsdrif Kameel Kraaipan Madibogo Mafikeng Mareetsane Piet Plessis Springbokpan Vergeleë Vryburg Vryhof | Amalia Barberspan Delareyville Excelsior Geysdorp Hallat's Hope Migdol Nooitgedacht Schweizer-Reneke Taaibospan | Bamboesspruit Klerksdorp Leeudoringstad Makwassie Regina Steelpoort Wolmaranstad |
| WHEAT | | | | | |
| Protein (12%mb), % | 11.30 | 11.78 | 13.18 | 13.45 | 12.27 |
| Falling number, sec | 419 | 319 | 363 | 379 | 385 |
| 1000 Kernel mass (13%mb), g | 35.6 | 37.5 | 36.5 | 34.1 | 31.8 |
| Hectolitre mass (dirty), kg/hl | 79.5 | 77.1 | 76.8 | 74.5 | 74.0 |
| Screenings (<1.8mm), % | 1.87 | 1.91 | 1.37 | 3.71 | 3.55 |
| Sprouted kernels, % | 0.08 | 0.66 | 0.05 | 0.25 | 0.10 |
| Number of samples | 19 | 31 | 3 | 5 | 4 |
| CULTIVARS | | | | | |
| 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 % occurrence SST 825 | 19.3 | 34.4 | 3.3 | 9.5 | 2.0 |
| Kariega | 3.0 | 11.1 | 9.7 | | 1.2 |
| SST 822 | 0.6 | 1.1 | 12.3 | 64.5 | |
| Number of samples | 19 | 31 | 3 | 5 | 4 |
| MIXOGRAM (Quadromat) | | | | | |
| Peak time, min | 2.4 | 2.7 | 3.0 | 3.4 | 2.2 |
| Tail height (6min), mm | 47 | 50 | 53 | 54 | 48 |
| Number of samples | 19 | 31 | 3 | 5 | 4 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 |
| BÜHLER EXTRACTION, % | 75.1 75.8 75.5 75.1 | 75.5 75.4 74.7 74.8 | | 73.2 | |
| FLOUR | | | | | |
| Protein (12%mb), % | 11.6 10.3 9.6 8.6 | 11.2 10.4 10.2 10.8 | | 13.3 | |
| Colour, KJ | -1.1 -1.5 -1.4 -1.3 | -1.1 -1.0 -1.0 -0.8 | | 1.7 | |
| FARINOGRAM | | | | | |
| Water absorption (14%mb), % | 61.9 61.6 61.9 59.2 | 62.5 61.7 60.6 63.7 | | 64.3 | |
| Development time, min | 4.2 3.7 3.0 2.3 | 3.7 4.0 3.7 3.7 | | 6.7 | |
| Stability, min | 5.9 5.3 4.1 3.5 | 4.9 5.9 5.6 5.3 | | 8.8 | |
| Mixing Tolerance Index, BU | 56 68 80 88 | 70 56 61 62 | | 48 | |
| EXTENSOGRAM (45 min pull) | | | | | |
| Area, cm ² | 84 64 56 43 | 70 69 75 70 | | 107 | |
| Maximum height, BU | 320 290 250 225 | 270 290 310 305 | | 350 | |
| Extensibility, cm | 18.0 15.3 15.3 13.3 | 17.6 16.3 15.7 16.3 | | 21.0 | |
| ALVEOGRAM | | | | | |
| Strength, cm ² | 38.7 31.8 28.6 20.5 | 37.2 34.6 34.3 35.0 | | 46.3 | |
| Stability (P), mm | 86 88 87 75 | 87 85 82 96 | | 89 | |
| Distensibility (L), mm | 107 81 74 59 | 106 97 101 80 | | 137 | |
| Configuration ratio (P/L) | 0.81 1.08 1.17 1.27 | 0.82 0.87 0.81 1.20 | | 0.65 | |
| MIXOGRAM | | | | | |
| Peak time, min | 2.2 2.5 2.3 2.3 | 2.2 2.5 2.3 2.0 | | 2.8 | |
| 100g BAKING TEST | | | | | |
| Loaf volume, cm ³ | 950 900 860 790 | 955 880 905 825 | | 955 | |
| Evaluation | 0 0 0 0 | 0 0 0 1 | | 2 | |

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

| PRODUCTION REGION | (17) | (18) | (19) | (20) |
|----------------------------------|---|---|--|---|
| | North-West Central Northern Region (Ottosdal) | North-West Central Region (Ventersdorp) | North-West Central Region (Lichtenburg) | North-West Eastern Region |
| Intake silos | Bospoort Hartbeesfontein Kleinharts Meliadora Ottosdal Rostrataville Vermaas Werda | Bodenstein Buckingham Coligny Enselspruit Makokskraal Potchefstroom Ventersdorp | Grootpan Halfpad Hibernia Lichtenburg Lottiehalte Lusthof | Battery Boons Brits Derby Koster Rustenburg Swaruggens Syferbult |
| WHEAT | | | | |
| Protein (12% mb), % | 12.07 | 13.16 | 12.91 | 11.81 |
| Falling number, sec | 370 | 367 | 365 | 348 |
| 1000 Kernel mass (13% mb), g | 38.4 | 38.8 | 36.5 | 35.4 |
| Hectolitre mass (dirty), kg/hl | 77.5 | 79.6 | 78.5 | 77.3 |
| Screenings (<1.8mm), % | 1.91 | 0.91 | 1.46 | 2.06 |
| Sprouted kernels, % | 0.15 | 0.20 | 0.05 | 0.28 |
| Number of samples | 7 | 2 | 12 | 14 |
| CULTIVARS | | | | |
| SST 806 | 59.4 | 40.0 | 46.6 | 31.9 |
| SST 876 | 31.6 | 22.0 | 27.8 | 26.9 |
| with highest % occurrence | Olifants | 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 |
| Number of samples | 7 | 2 | 12 | 14 |
| MIXOGRAM (Quadromat) | | | | |
| Peak time, min | 2.7 | 3.2 | 2.6 | 3.3 |
| Tail height (6min), mm | 51 | 54 | 51 | 53 |
| Number of samples | 7 | 2 | 12 | 14 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 |
| BÜHLER EXTRACTION, % | 76.1 76.4 74.0 76.0 | 75.4 | 75.6 76.4 75.2 | 76.1 75.0 75.0 |
| FLOUR | | | | |
| Protein (12% mb), % | 12.5 11.3 12.8 8.6 | 12.1 | 12.6 11.0 11.8 | 12.1 10.7 9.4 |
| Colour, KJ | -1.4 -0.6 -0.8 -0.9 | -0.8 | -0.1 -1.1 0.2 | -0.3 -0.9 -1.4 |
| FARINOGRAM | | | | |
| 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 |
| EXTENSOGRAM (45 min pull) | | | | |
| Area, cm ² | 145 120 139 65 | 129 | 106 90 85 | 114 108 78 |
| 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 |
| ALVEOGRAM | | | | |
| Strength, cm ² | 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 |
| MIXOGRAM | | | | |
| Peak time, min | 2.3 2.5 3.3 2.7 | 2.8 | 2.3 2.4 2.3 | 2.6 2.8 2.8 |
| 100g BAKING TEST | | | | |
| Loaf volume, cm ³ | 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 North-Western Region (Viljoenskroon) | Free State South-Eastern Region | Free State Northern Region | Free-State North-Western Region (Bothaville) | Free-State North-Western Region (Bultfontein) |
| Intake silos | Attie Groenebloem Heuningspruit Koppies Rooiwal Vierfontein Viljoenskroon Vredefort Weiveld | Arlington Kaallaagte Libertas Marquard Meets Monte Video Senekal Steynsrus | Gottenburg Heilbron Hoogte Mooigeleë Petrus Steyn Wolwehoek | Allanridge Bothaville Mirage Odendaalsrus Schoonspruit Schuttendraai | Bultfontein Losdoorns Protespan Tierfontein Wesselsbron Willemsrust |
| WHEAT | | | | | |
| Protein (12% mb), % | 14.57 | 14.56 | 14.57 | 13.09 | 13.04 |
| Falling number, sec | 335 | 318 | 364 | 300 | 371 |
| 1000 Kernel mass (13% mb), g | 32.1 | 30.6 | 33.7 | 33.1 | 33.2 |
| Hectolitre mass (dirty), kg/hl | 77.0 | 76.8 | 77.6 | 75.7 | 77.6 |
| Screenings (<1.8mm), % | 1.47 | 1.62 | 1.53 | 2.09 | 1.76 |
| Sprouted kernels, % | 0.02 | 0.05 | 0.00 | 0.02 | 0.02 |
| Number of samples | 8 | 26 | 13 | 7 | 29 |
| CULTIVARS | | | | | |
| cultivars | Elands PAN 3349 | 25.0 23.9 | 22.9 5.4 | 28.8 2.4 | 2.6 14.0 |
| with highest % occurrence | Gariep SST 806 SST 399 | 7.3 1.6 | 20.0 1.0 25.8 | 7.7 15.7 12.0 | 2.0 34.6 5.2 |
| Number of samples | 8 | 26 | 13 | 7 | 29 |
| MIXOGRAM (Quadromat) | | | | | |
| Peak time, min | 3.3 | 2.9 | 2.6 | 3.1 | 2.9 |
| Tail height (6min), mm | 57 | 55 | 54 | 53 | 53 |
| Number of samples | 8 | 26 | 13 | 7 | 29 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 |
| BÜHLER EXTRACTION, % | 74.1 74.8 | 74.1 73.1 73.6 73.8 | 74.9 74.6 74.2 | 75.9 72.8 | 74.2 74.2 74.2 72.5 |
| FLOUR | | | | | |
| Protein (12% mb), % | 13.0 13.6 | 13.6 13.3 14.7 14.4 | 13.1 12.8 13.6 | 11.6 10.1 | 12.0 11.1 11.9 13.7 |
| Colour, KJ | 0.3 0.3 | 0.2 -0.3 0.8 0.5 | 1.0 -0.6 0.1 | -0.9 -1.2 | -0.6 -0.8 -0.9 0.1 |
| FARINOGRAM | | | | | |
| Water absorption (14% mb), % | 61.8 63.1 | 62.9 62.5 63.9 63.3 | 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 6.0 | 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 7.8 | 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 46 | 55 39 60 | 57 63 | 48 51 54 65 |
| EXTENSOGRAM (45 min pull) | | | | | |
| Area, cm ² | 122 129 | 130 125 125 105 | 105 121 105 | 132 95 | 120 100 115 95 |
| Maximum height, BU | 430 440 | 420 540 380 360 | 405 420 385 | 425 430 | 415 395 380 325 |
| Extensibility, cm | 19.2 19.0 | 21.0 15.9 22.8 20.5 | 17.7 19.7 18.7 | 20.0 15.6 | 20.0 17.4 21.2 20.1 |
| ALVEOGRAM | | | | | |
| Strength, cm ² | 54.1 52.9 | 53.8 56.9 53.8 49.5 | 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 85 | 97 91 95 | 84 89 | 97 97 79 85 |
| Distensibility (L), mm | 120 111 | 130 121 129 132 | 105 116 107 | 123 81 | 106 99 136 111 |
| Configuration ratio (P/L) | 0.81 0.90 | 0.70 0.83 0.70 0.64 | 0.93 0.78 0.89 | 0.68 1.11 | 0.91 0.98 0.58 0.76 |
| MIXOGRAM | | | | | |
| Peak time, min | 2.8 2.8 | 2.4 2.8 2.3 2.3 | 2.3 2.3 2.3 | 2.3 3.3 | 2.5 2.5 2.2 2.0 |
| 100g BAKING TEST | | | | | |
| Loaf volume, cm ³ | 965 950 | 1015 990 1040 1070 | 995 935 975 | 930 825 | 955 900 985 1010 |
| Evaluation | 1 2 | 1 1 2 1 | 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) Free State Central Region | | | | (25) Free State South-Western Region | | | | (28) Free State Eastern Region | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------------------|-----------|-----------|-----------|---|---------------|-----------|------------|--------------------------------------|------------|-----------|-----------|-----------|----------|-------------|-----------|-------------|------------|-------------|-----------|------------|-------------|---------|------------|--------|----------|------------|-------|-----------|------------|------------|--------------|-------|-------|----------|----------|-------|--------|-----------|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Intake silos | Bloemfontein | Brandfort | De Brug | Geneva | Hennenman | Koffiefontein | Kroonstad | Petrusburg | Theunissen | Van Tonder | Welgeleë | Winburg | Bethlehem | Clocolan | De Wetsdorp | Ficksburg | Fouriesburg | Marseilles | Modderpoort | Slabberts | Tweespruit | Westminster | Zastron | Afrikaskop | Ascent | Cornelia | Daniëlsrus | Eeram | Frankfort | Harrismith | Jim Fouché | Kransfontein | Memel | Reitz | Tweeling | Villiers | Vrede | Warden | Windfield | | | | |
| WHEAT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protein (12%mb), % | 13.60 | | | | 13.43 | | | | 14.85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Falling number, sec | 358 | | | | 308 | | | | 339 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 Kernel mass (13%mb), g | 30.3 | | | | 31.8 | | | | 33.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hectolitre mass (dirty), kg/hl | 75.6 | | | | 76.9 | | | | 77.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Screenings (<1.8mm), % | 2.99 | | | | 2.12 | | | | 1.53 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sprouted kernels, % | 0.01 | | | | 0.00 | | | | 0.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of samples | 46 | | | | 29 | | | | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CULTIVARS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| cultivars with highest % occurrence | Gariep | 32.0 | | | | 12.7 | | | | 1.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SST 806 | 18.2 | | | | 1.4 | | | | 12.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PAN 3377 | 7.0 | | | | 11.0 | | | | 23.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Elands | 2.6 | | | | 33.4 | | | | 28.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SST 399 | 2.3 | | | | 9.6 | | | | 5.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of samples | 46 | | | | 29 | | | | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MIXOGRAM (Quadromat) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak time, min | 3.0 | | | | 2.9 | | | | 2.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tail height (6min), mm | 55 | | | | 54 | | | | 54 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of samples | 46 | | | | 29 | | | | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | B1 | B2 | B3 | B4 | B1 | B2 | B3 | B4 | B1 | B2 | B3 | B4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BÜHLER EXTRACTION, % | 73.2 | 72.9 | 72.8 | 71.9 | 74.0 | 75.2 | 72.8 | 73.6 | 75.1 | 73.6 | 74.1 | 72.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FLOUR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protein (12%mb), % | 12.3 | 12.5 | 13.2 | 12.1 | 12.1 | 12.1 | 13.8 | 13.3 | 13.4 | 14.0 | 13.3 | 14.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FARINOGRAM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EXTENSOGRAM (45 min pull) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Area, cm ² | 106 | 120 | 150 | 105 | 92 | 90 | 143 | 140 | 102 | 122 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALVEOGRAM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Strength, cm ² | 44.0 | 48.2 | 53.7 | 47.2 | 53.1 | 44.3 | 64.7 | 56.9 | 46.8 | 54.4 | 54.3 | 66.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stability (P), mm | 91 | 94 | 94 | 83 | 99 | 83 | 96 | 90 | 97 | 98 | 101 | 106 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distensibility (L), mm | 110 | 106 | 122 | 130 | 118 | 127 | 144 | 139 | 113 | 117 | 110 | 134 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Configuration ratio (P/L) | 0.82 | 0.89 | 0.77 | 0.64 | 0.83 | 0.65 | 0.66 | 0.65 | 0.86 | 0.84 | 0.92 | 0.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MIXOGRAM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak time, min | 2.3 | 2.8 | 2.8 | 2.5 | 2.5 | 2.2 | 2.9 | 2.5 | 2.0 | 2.4 | 2.8 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100g BAKING TEST | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Loaf volume, cm ³ | 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) | (32) | (33) |
|----------------------------------|--|--|---|
| | M pumalanga Eastern Region | M pumalanga Western Region | M pumalanga Northern Region |
| Intake silos | Amersfoort Badplaas Carolina Davel Ermelo Estancia Lothair Maizefield Mkondo Morgenzon Overvaal Panbult | Argent Dryden Endicott Elof Hawerklip Kendal Ogies | Driefontein Lydenburg Marble Hall Middelburg Stoffelberg Pan Arnot Wonderfontein |
| WHEAT | | | |
| Protein (12%mb), % | 13.34 | 12.67 | 12.35 |
| Falling number, sec | 334 | 414 | 439 |
| 1000 Kernel mass (13%mb), g | 39.4 | 41.5 | 39.0 |
| Hectolitre mass (dirty), kg/hl | 78.9 | 80.9 | 79.4 |
| Screenings (<1.8mm), % | 1.45 | 1.13 | 2.30 |
| Sprouted kernels, % | 0.07 | 0.02 | 0.05 |
| Number of samples | 6 | 3 | 5 |
| CULTIVARS | | | |
| SST 806 | 40.5 | 78.3 | 38.2 |
| cultivars SST 825 | 19.7 | 7.7 | 24.0 |
| with highest % occurrence | Elands SST 876 SST 822 | 16.8 4.8 14.0 | 9.6 16.4 |
| Number of samples | 6 | 3 | 5 |
| MIXOGRAM (Quadromat) | | | |
| Peak time, min | 2.6 | 2.1 | 2.7 |
| Tail height (6min), mm | 52 | 51 | 51 |
| Number of samples | 6 | 3 | 5 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 |
| BÜHLER EXTRACTION, % | 76.2 | | 76.1 75.6 |
| FLOUR | | | |
| Protein (12%mb), % | 13.0 | | 12.3 9.5 |
| Colour, KJ | -0.7 | | -0.6 -1.2 |
| FARINOGRAM | | | |
| Water absorption (14%mb), % | 65.3 | | 63.3 59.1 |
| Development time, min | 3.5 | | 4.3 2.0 |
| Stability, min | 4.0 | | 5.7 6.5 |
| Mixing Tolerance Index, BU | 56 | | 60 37 |
| EXTENSOGRAM (45 min pull) | | | |
| Area, cm2 | 52 | | 71 89 |
| Maximum height, BU | 190 | | 250 350 |
| Extensibility, cm | 18.2 | | 19.2 17.6 |
| ALVEOGRAM | | | |
| Strength, cm2 | 31.7 | | 33.8 31.2 |
| Stability (P), mm | 81 | | 82 77 |
| Distensibility (L), mm | 108 | | 103 89 |
| Configuration ratio (P/L) | 0.75 | | 0.79 0.86 |
| MIXOGRAM | | | |
| Peak time, min | 1.5 | | 2.0 2.8 |
| 100g BAKING TEST | | | |
| Loaf volume, cm3 | 965 | | 925 780 |
| Evaluation | 1 | | 2 0 |

SOUTH AFRICAN

SUMMER RAINFALL WHEAT (AND IRRIGATION)

Gauteng, Limpopo and Kwazulu-Natal Provinces

| PRODUCTION REGION | (34) Gauteng | (35) Limpopo Region | (36) KwaZulu-Natal |
|--------------------------------------|---|--|---|
| Intake silos | Bloekomspruit Bronkhorstspuit Glenroy Goeie Hoek Kaalfontein Middelvlei Nigel Oberholzer Raathsvlei | Alma Crecy Immerpan Lehau Naboomspruit Northam Nutfield Nylstroom Pienaarsrivier Pietersburg Potgietersrus Roedtan Settlers Tzaneen Vaalwater Warmbad | Bergville Bloedrivier Dannhauser Dundee Mizpah New Amalfi Paulpietersburg Vryheid Winterton |
| WHEAT | | | |
| Protein (12%mb), % | 14.00 | 13.14 | 12.79 |
| Falling number, sec | 397 | 386 | 395 |
| 1000 Kernel mass (13%mb), g | 35.3 | 35.3 | 36.3 |
| Hectolitre mass (dirty), kg/hl | 77.0 | 77.0 | 77.8 |
| Screenings (<1.8mm), % | 2.76 | 1.88 | 1.79 |
| Sprouted kernels, % | 0.02 | 0.23 | 0.14 |
| Number of samples | 6 | 19 | 8 |
| CULTIVARS | | | |
| 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 |
| Number of samples | 6 | 19 | 8 |
| MIXOGRAM (Quadromat) | | | |
| Peak time, min | 2.7 | 3.0 | 3.1 |
| Tail height (6min), mm | 56 | 51 | 54 |
| Number of samples | 6 | 19 | 8 |
| | B1 B2 B3 B4 | B1 B2 B3 B4 | B1 B2 B3 B4 |
| BÜHLER EXTRACTION, % | 75.5 76.4 | 75.1 75.2 74.4 | 76.4 |
| FLOUR | | | |
| Protein (12%mb), % | 12.8 12.4 | 12.4 12.1 10.0 | 12.0 |
| Colour, KJ | -0.1 -0.1 | -0.1 -0.4 -0.5 | -0.6 |
| FARINOGRAM | | | |
| Water absorption (14%mb), % | 63.8 61.8 | 62.5 61.8 60.5 | 61.9 |
| Development time, min | 5.3 5.9 | 5.7 5.0 4.2 | 5.7 |
| Stability, min | 6.0 7.9 | 8.9 7.3 5.3 | 8.2 |
| Mixing Tolerance Index, BU | 61 52 | 38 45 67 | 43 |
| EXTENSOGRAM (45 min pull) | | | |
| Area, cm2 | 105 128 | 107 103 81 | 125 |
| Maximum height, BU | 360 420 | 430 400 360 | 410 |
| Extensibility, cm | 20.7 20.5 | 17.9 17.4 15.2 | 20.1 |
| ALVEOGRAM | | | |
| Strength, cm2 | 43.3 50.8 | 47.2 40.5 29.7 | 46.3 |
| Stability (P), mm | 88 84 | 95 92 86 | 89 |
| Distensibility (L), mm | 125 145 | 109 97 77 | 122 |
| Configuration ratio (P/L) | 0.71 0.58 | 0.87 0.95 1.12 | 0.73 |
| MIXOGRAM | | | |
| Peak time, min | 2.2 2.5 | 2.7 2.4 2.5 | 2.5 |
| 100g BAKING TEST | | | |
| Loaf volume, cm3 | 945 940 | 885 965 815 | 870 |
| Evaluation | 1 0 | 2 0 0 | 0 |

QUALITY DIFFERENCES BETWEEN WHEAT GRADES 1 TO 4

Grade 1 wheat gave on average a higher percentage extraction (about 2,0 % higher) than the average percentage extraction from grade 4 wheat.

The farinogram also gave on average about 2,0 % higher water absorption on grade 1 wheat than on grade 4 wheat. The farinogram development time also gave a better result on grade 1 wheat than on grade 4 wheat. A definite trend can be seen, with both the farinogram water absorption percentage and farinogram development time giving better results with grade 1 wheat and declining through grade 2, grade 3 to grade 4. This correlates with a higher protein content which mainly separates the four wheat classes.

The same trend could be seen with the alveogram strength, which increased from 35,3 cm² (grade 4 wheat) to 42,3 cm² (grade 1 wheat) on average. The extensogram extensibility (cm) also increased from 16,5 cm (grade 4 wheat) to 18,7 cm (grade 1 wheat) on average.

MYCOTOXINS

Mycotoxins, as secondary metabolites of moulds or fungi, can exert toxic effects on humans and animals consuming contaminated foods and feeds. Cereal grains can become contaminated with mycotoxins during the pre- and postharvest periods. Mycotoxins in human and animal health will be an issue which will need continual monitoring, research, intervention and control.

This was the first crop quality survey in which mycotoxin analyses were done. Thirty samples (representing the different regions) were randomly selected for the mycotoxin analyses. The average aflatoxin was 5,4 ppb. According to Act 54 of 1972, Foodstuffs, Cosmetics and Disinfectants, the allowable level of total aflatoxin is 10 ppb (µg/kg). According to Act 36 of 1947, Fertilizers, Farm Feeds, Agricultural and Stock Remedies the allowable level of total aflatoxin is 10 to 50 ppb (µg/kg).

The average fumonisin was 0,71 ppm. A tolerance level of 0,1 to 0,2 ppm (mg/kg) total fumonisins has provisionally been recommended for maize and maize-based products intended for human consumption in Africa, based on risk assessment studies. These recommendations can be applied to wheat. In the interim, the South African grain industry should aim at a "tolerance level" of 0,3 ppm (maximum of 0,3 mg/kg) at most of total fumonisins for human consumption, until further international developments are made known.

Aflatoxin and fumonisin were detected in all 30 samples tested.

No deoxynivalenol was detected. Suggested levels for deoxynivalenol of less than 2,0 ppm for animal feeds and 1,0 ppm for commodities destined for human consumption are recommended.

Zearalenone were present in all 30 samples tested, but was all lower than the method's detection limit of 0,1 ppm. According to experts, samples containing more than 0,1 to 0,2 ppm (mg/kg) zearalenone can pose a health risk.

An average of 0,16 ppm T - 2 were detected. T - 2 toxin is considered ten times more toxic than deoxynivalenol (DON). The average level of ochratoxin was 0,52 ppb. Little is known about the accepted levels.

MYCOTOXIN RESULTS FOR THE 2003/2004 SEASON

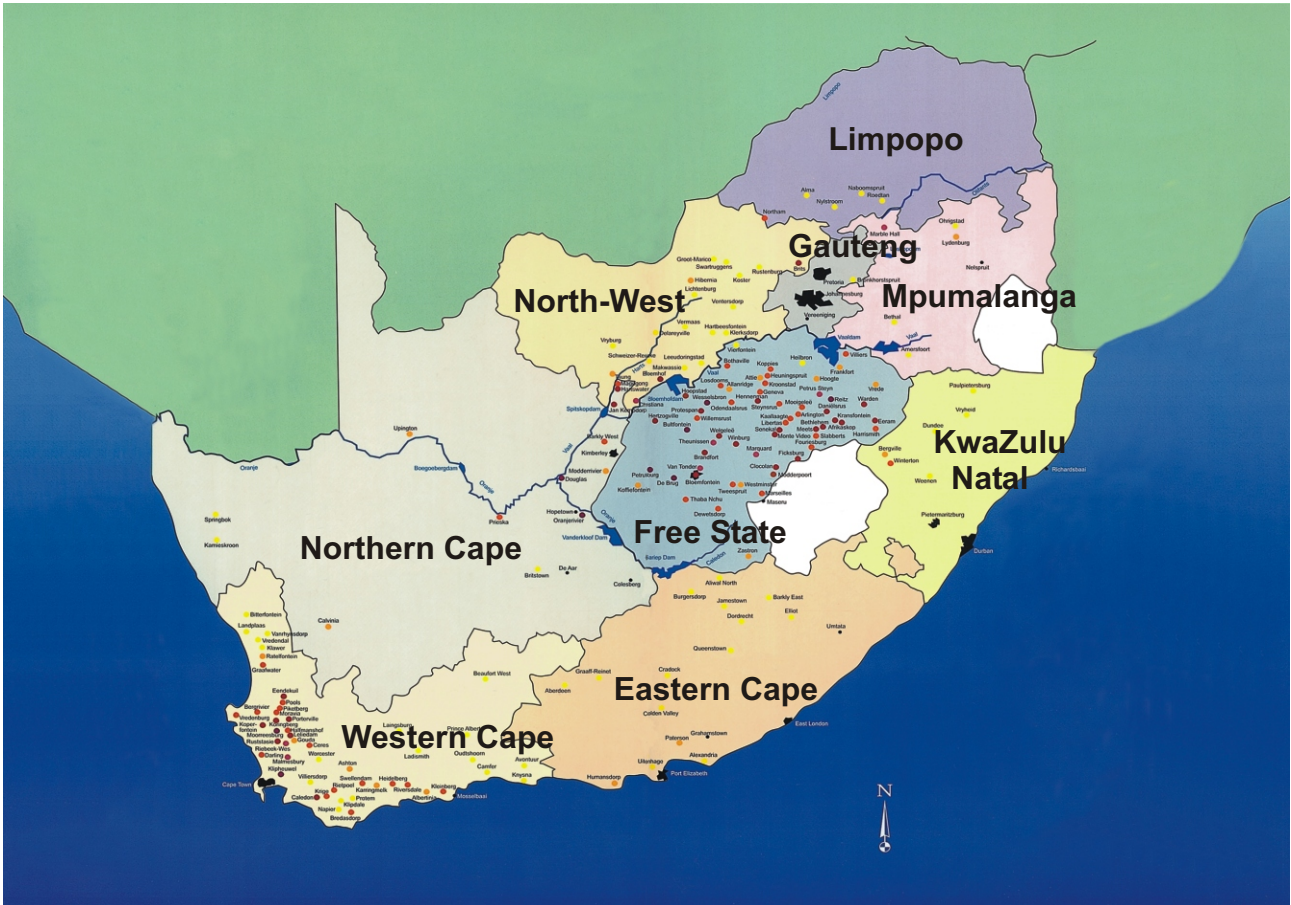
| Region | Aflatoxin ppb LOD <5.0 | Fumonisin ppm LOD <0.25 (out of scope) | Deoxynivalenol ppm LOD <0.50 | Zearalenone ppm LOD <0.1 (out of scope) | T-2 ppm LOD <0.15 (out of scope) | Ochratoxin ppb LOD <0.47 |
|----------------|------------------------------|---|------------------------------------|--|---|--------------------------------|
| 1 | <5.0 | <0.25 | 0 | <0.1 | <0.15 | <0.47 |
| 1 | <5.0 | 0.38 | 0 | <0.1 | <0.15 | 0 |
| 2 | 7 | 0.53 | 0 | <0.1 | 0.36 | 1.3 |
| 2 | 8 | 1.0 | 0 | <0.1 | 0.35 | 1.0 |
| 3 | <5.0 | 0.72 | 0 | <0.1 | 0.22 | 0.97 |
| 3 | 5 | 0.54 | 0 | <0.1 | 0.37 | 0.62 |
| 4 | 5 | 0.64 | 0 | <0.1 | <0.15 | 0.58 |
| 4 | <5.0 | 0.29 | 0 | <0.1 | 0.23 | 0 |
| 6 | <5.0 | 0.74 | 0 | <0.1 | 0 | <0.47 |
| 12 | <5.0 | 1.4 | 0 | <0.1 | 0.34 | 0.71 |
| 14 | <5.0 | 0.57 | 0 | <0.1 | 0 | 1.0 |
| 17 | 6 | 0.65 | 0 | <0.1 | <0.15 | 0.65 |
| 19 | <5.0 | 0.54 | 0 | <0.1 | 0.20 | 1.0 |
| 20 | 5 | 1.1 | 0 | <0.1 | 0.24 | 0.48 |
| 20 | 6 | 1.3 | 0 | <0.1 | <0.15 | <0.47 |
| 21 | <5.0 | 0.56 | 0 | <0.1 | <0.15 | <0.47 |
| 22 | 6 | 0.92 | 0 | <0.1 | 0.30 | <0.47 |
| 23 | <5.0 | 1.7 | 0 | <0.1 | 0 | 0.67 |
| 24 | <5.0 | 0.36 | 0 | <0.1 | 0 | <0.47 |
| 25 | <5.0 | 0.32 | 0 | <0.1 | 0.20 | <0.47 |
| 25 | <5.0 | 0.65 | 0 | <0.1 | 0 | <0.47 |
| 26 | <5.0 | 0.34 | 0 | <0.1 | <0.15 | <0.47 |
| 27 | 5 | 1.5 | 0 | <0.1 | 0 | <0.47 |
| 28 | 5 | 1.2 | 0 | <0.1 | 0.28 | 1.0 |
| 30 | <5.0 | 0.62 | 0 | <0.1 | <0.15 | 0 |
| 32 | <5.0 | 0.71 | 0 | <0.1 | 0 | 0 |
| 33 | 6 | 0.75 | 0 | <0.1 | 0.32 | 0 |
| 34 | 5 | 0.44 | 0 | <0.1 | 0 | 0 |
| 35 | 9 | 0.41 | 0 | <0.1 | <0.15 | 0.56 |
| 36 | <5.0 | <0.25 | 0 | <0.1 | <0.15 | <0.47 |
| Average | 5.4 | 0.71 | 0 | <0.1 | 0.16 | 0.52 |

Please note:

Limit of detection (LOD) means the lowest level that can be detected accurately by the fluorometer. Should the fluorometer give a reading above zero but lower than the limit of detection, the result is reported as < "limit of detection".

The fumonisin, zearalenone and T-2 mycotoxin analyses were performed outside the normal range of work as wheat does not form part of the method(s) scope. No Vicam methods exists for the determination of the above mentioned toxins on wheat using the fluorometer.

RSA WHEAT PRODUCTION AREAS

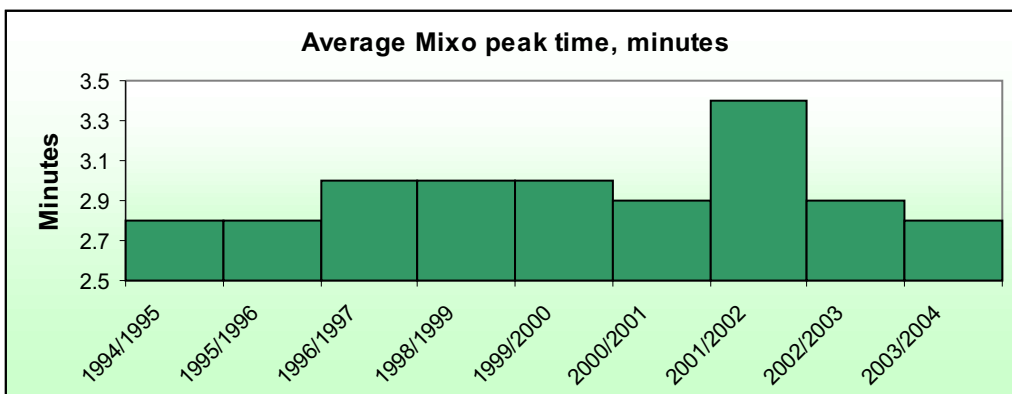
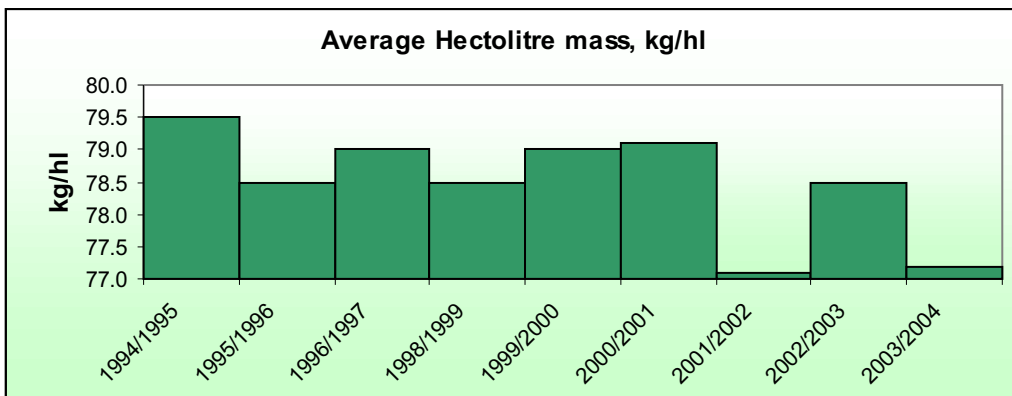
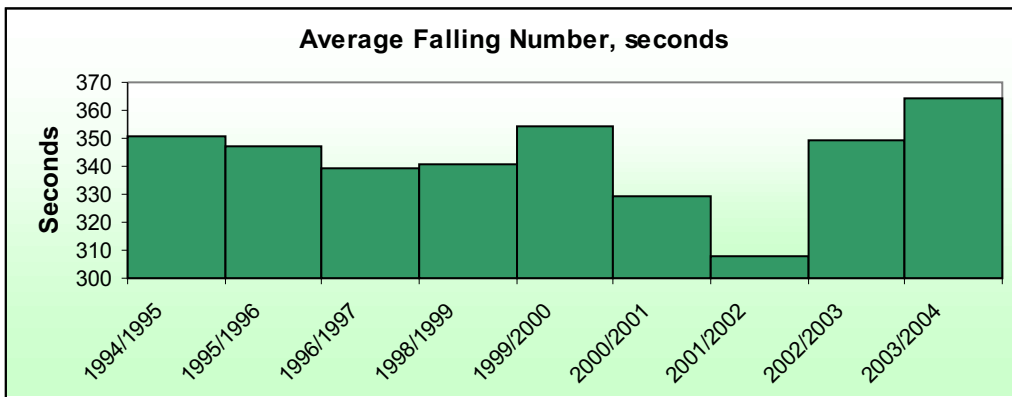
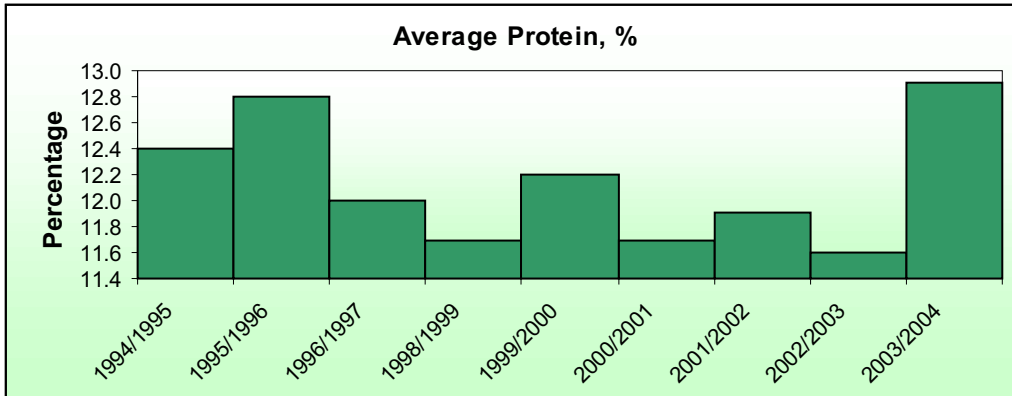


WHEAT SEED SOLD BY COMMERCIAL GRAIN SILO OWNERS TO WHEAT PRODUCERS FOR THE 2003 PLANTING SEASON

| <u>Cultivar</u> | <u>%</u> | <u>Cultivar</u> | <u>%</u> |
|-----------------|----------|-----------------|------------|
| SST 88 | 23.65 | SST 333 | 0.23 |
| SST 57 | 17.93 | Pan 3377 | 0.22 |
| SST 806 | 16.18 | Pan 3492 | 0.22 |
| SST 94 | 9.58 | PAN 3349 | 0.18 |
| SST 876 | 7.34 | Limpopo | 0.15 |
| SST 65 | 4.81 | Betta DN | 0.15 |
| SST 825 | 4.41 | Baviaans | 0.12 |
| SST 822 | 3.77 | Gariep | 0.11 |
| Elands | 3.46 | Pan 3191 | 0.11 |
| SST 399 | 1.63 | Pan 3364 | 0.10 |
| Olifants | 1.43 | SST 367 | 0.06 |
| Kariega | 1.02 | SST 936 | 0.04 |
| SST 363 | 0.51 | Pan 3235 | 0.02 |
| SST 966 | 0.50 | Komati | 0.02 |
| SST 124 | 0.45 | Oom Charl | 0.01 |
| Marico | 0.39 | SST 334 | 0.007 |
| Steenbras | 0.39 | Caledon | 0.004 |
| SST 983 | 0.29 | Hugenoot | 0.003 |
| Pan 3490 | 0.28 | SST 75 | 0.001 |
| Inia | 0.23 | | <u>100</u> |

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

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 (12% mb), % | FN, sec | Hlm, kg/hl | Mix PT, min | n | Protein (12% mb), % | FN, sec | Hlm, kg/hl | Mix PT, min | n | Protein (12% mb), % | FN, sec | Hlm, kg/hl | Mix PT, min | n |
| 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 | - | - | - | - | - |
| Ave. | 12.9 | 364 | 77.2 | 2.8 | 472 | 11.6 | 349 | 78.6 | 2.9 | 480 | 11.9 | 308 | 77.1 | 3.4 | 480 |

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 **B1**

76 **C1**

14 79 90 **DS**

11 76 **B2**

74 **C2**

13 76 80 **D1**

10 74 **B3**

12 74 70 **D2**

FN
Minimum
200 s

9 72 **B4**

FN
Minimum
150 s

8 70 **UT**

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, R. 876 of 14 September 2001 and R. 979 of 19 July 2002, R. 1210 of 29 August 2003 and Dispensation: Reference No. 21/4/1/1 and Serial No. 791 of 25 July 2003).

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.

Screenings means all material that passes through a standard sieve. A standard sieve is a hand sieve which consists of a slotted, stainless steel sieve with a thickness of 1,0 mm, mounted in durable plastic, with apertures 1,8 mm wide and 12,7 mm long, which fits into an aluminum pan with a solid bottom, and has an inner diameter of 300 mm and an outer diameter of 302,5 mm.

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.

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.

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 the falling number hammer mill fitted with a 0,8 mm screen.

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.

QUADROMAT 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.

MIXOGRAPH:

A 35 g mixograph is used. The amount of water added to the flour is adjusted according to the flour protein content. Industry Accepted Method 020 based on 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.

BÜHLER 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 plus flour obtained from bran that passed through a bran finisher. 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 26-21A, 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 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 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 **alveograph** 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

Mycotoxins are natural contaminants of food and feedstuffs with serious implications for public health and economics, in particular with relation to the international food trade.

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. Thirty samples of the 472 wheat crop samples were tested for aflatoxin, fumonisin, deoxynivalenol, zearalenone, T-2 toxin and ochratoxin.

| Fungi | Toxin | Method reference |
|--|----------------------|--|
| <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> <i>Fusarium poae</i> <i>Fusarium tricinctum</i> | T-2 | Vicam T-2 TAG Instruction Manual Apr 25, 2000 |