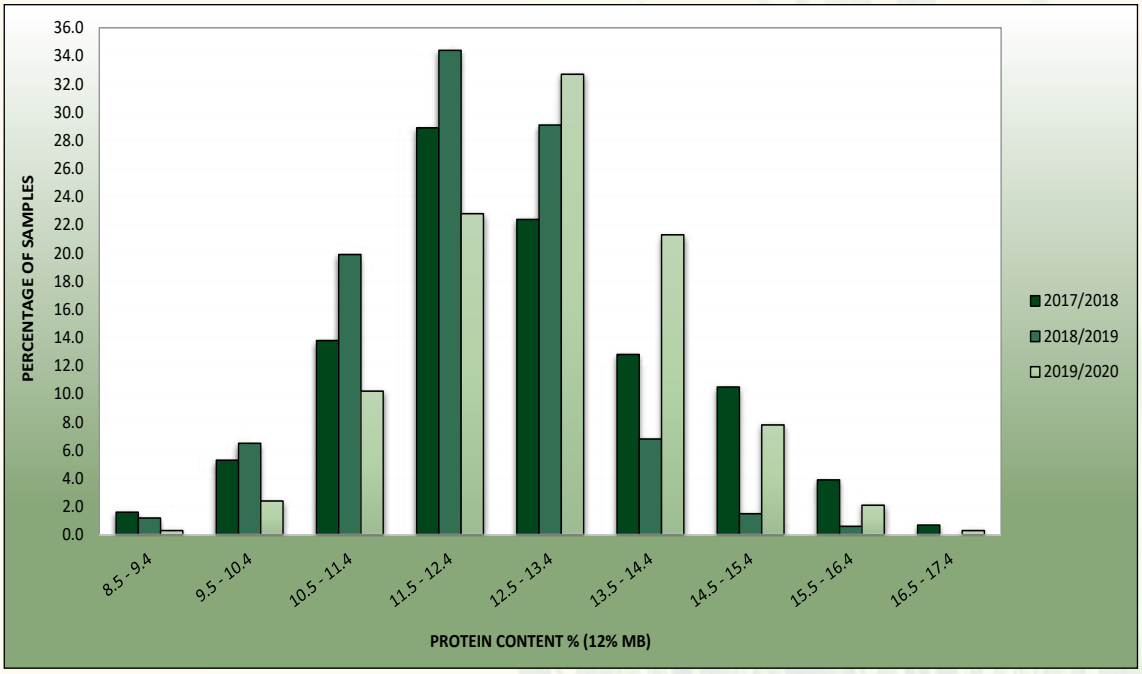
Crop quality of the 2019/20 season

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

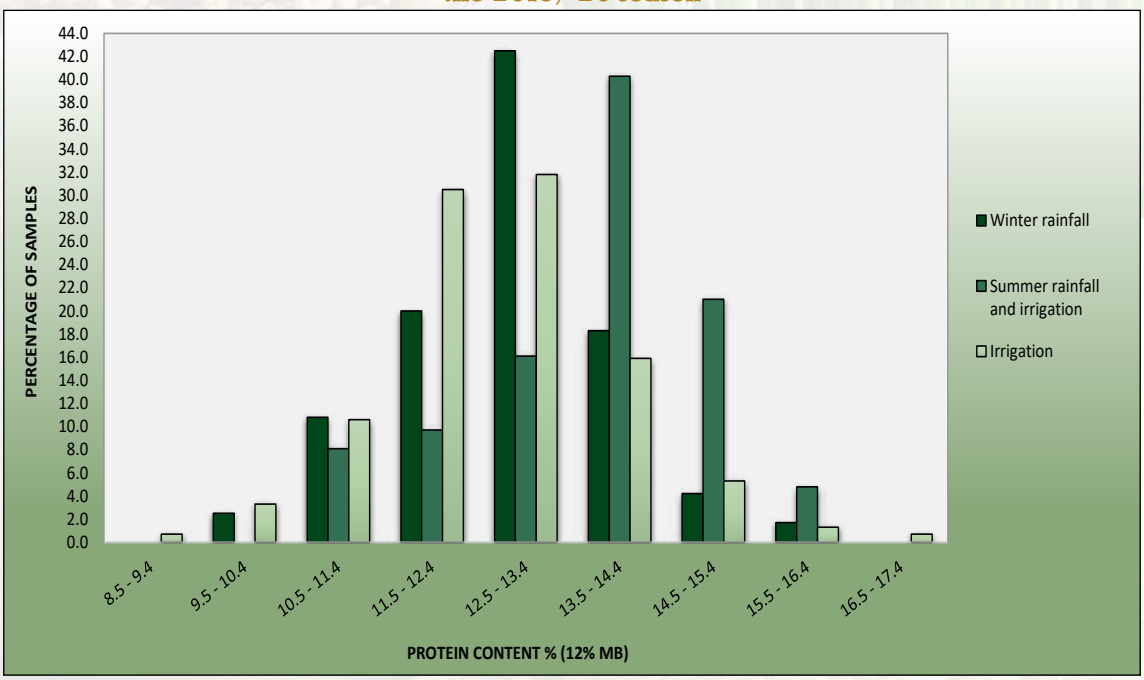
The national whole wheat protein average increased from 12.1% in the previous season to 12.9%. The ten-year national average is 12.1%. Protein content is generally a function of the growing environment (soil and climatic conditions) as well as fertiliser application. Please see Graphs 20 and 21 for the protein content distribution over the last three seasons and between the three major production areas.

Graph 20: Protein content distribution over the last three seasons



The Summer rainfall and Irrigation areas of the Free State reported the highest whole wheat protein average, namely 13.7%. The production regions in the Winter rainfall area of the Western Cape averaged 12.8% and the Irrigation areas 12.6%.

Graph 21: Protein content distribution between the three production areas during the 2019/20 season



Flour protein content is on average 0.5 to 1.2% lower than that of whole wheat and averaged 11.9% this season, one percent higher than the previous season. The protein loss can be attributed to the removal of the bran and aleuron layer as well as the germ during milling. The protein content is reported on a 12% moisture basis.

The average hectoliter mass of 78.9 kg/hl, the lowest average reported over the last ten seasons, decreased by 2.4 kg/hl compared to the previous season. The ten-year national average is 80.5 kg/hl. 55 samples (16.5%) reported values below the 76 kg/hl minimum level for Super grade, Grade 1 and Grade 2 wheat, of these 33 samples originated in the Western Cape (Winter rainfall area), nine in North West, 12 in the Free State and one in Gauteng. Regional averages ranged from 77.2 kg/hl in the Western Cape and 77.4 kg/hl in the Free State to 80.7 kg/hl in the Irrigation areas.

The 1000 kernel mass, reported on a 13% moisture basis, decreased from 39.2 g last season to 35.6 g this season. The 2017/18 season's average was 37.7 g. Averages over production areas varied from 32.4 g in the Free State to 34.0 g in the Winter rainfall areas and 38.2 g in the Irrigation areas. The weighted average percentage screenings obtained with a 1.8 mm slotted sieve was 1.92%, the highest of the past five seasons. The Winter rainfall areas reported the highest average percentage, namely 2.39% and the Irrigation areas the lowest of 1.36%. 62 (18.6%) of the 333 samples exceeded the 3% maximum permissible screenings level for Super grade to Grade 3. Most (59.7%) of these samples originated in the Western Cape.

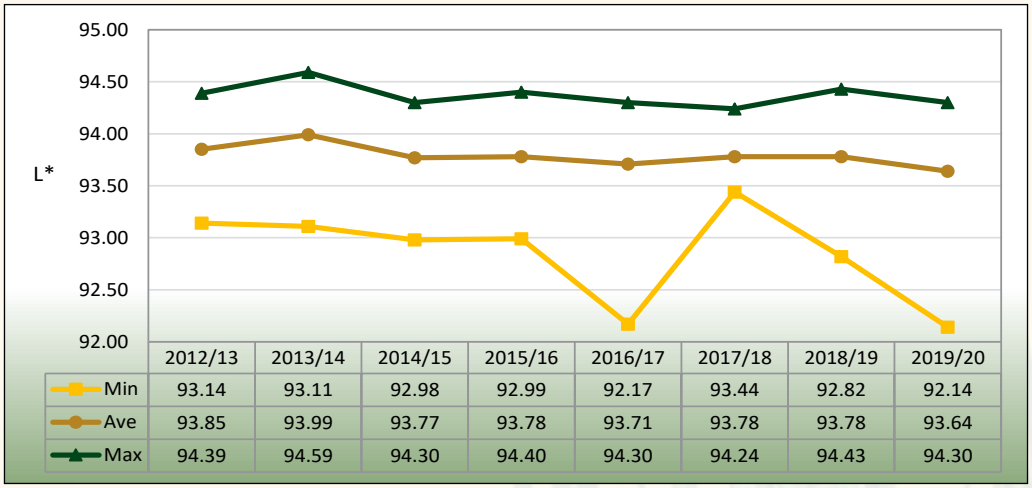
The national weighted average falling number value was 353 seconds, lower than the 397 seconds of last season's average as well as the ten-year weighted average value of 369 seconds. 32 (9.6%) of the samples analysed for this survey reported falling number values below 250 seconds, 28 of these were below 220 seconds and were downgraded to COW as a result. These samples originated from North West (N=13), Free State (N=13) and Gauteng (N=2). Last season only one sample was downgraded to COW due to a low falling number. The highest average falling number value of 367 seconds, was reported for the Western Cape and the lowest, namely 308 seconds for the Free State. All falling number values reported, are corrected for the altitude at which the test is performed.

The weighted mixogram peak time on flour milled on the Quadromat Junior mill averaged 3.0 minutes compared to the 2.8 minutes of the previous season and slightly longer than the ten-year average of 2.9 minutes. The weighted mixogram peak time of the flour from the Bühler mill was 2.6 minutes, equal to the previous four seasons. Mixing time, in general, decreases as protein content increases to about 12.0%, thereafter remaining approximately constant with flour protein increases.

Extraction rate is an indication of the flour yield that can be obtained from a given amount of wheat. The extraction rate achievable on industrial scale mills is a number of percentage points higher than on laboratory scale mills due to an increase in roller surface area. Industrial type mills are also set to obtain optimum extraction rates within certain quality parameters, whereas the milling procedure and laboratory scale mill at SAGL is not set to optimise extraction but rather indicate differences in milling quality. Composite samples per class and grade per production region are cleaned, tempered/conditioned and then milled to facilitate flour and dough quality assessment. The weighted average Bühler MLU 202 laboratory mill extraction for the composite samples was 74.8% compared to the 71.3% of the previous season.

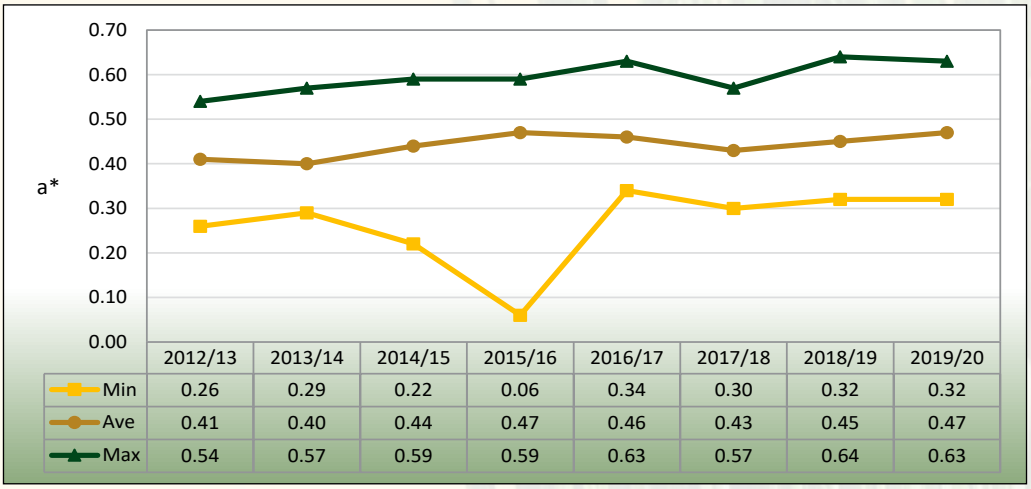
Colour is an important parameter of milled wheat since the colour of wheat flour affects the colour of the finished product, like the crumb colour of a loaf of bread. In general, a bright white colour flour is more desirable for most products. For the past eight seasons, a dry colour determination by means of a Konica Minolta CM-5 spectrophotometer has been done on the composite flour samples. The CIE L*a*b* (CIELAB) colour model uses lightness (L*) and two colour values (a* and b*), these colour coordinates define where a specific sample's colour lies in a Cartesian graph. L* represents lightness (100 being white and 0 being black), a* represents green to red variation and b* represents variation from blue to yellow. Please see Graphs 22 (L*), 23 (a*) and 24 (b*) for a comparison of the ranges in the CIE L*a*b* values obtained. The minimum and maximum values are based on a single composite sample's result in a specific season.

Graph 22: Range of L* values over eight seasons



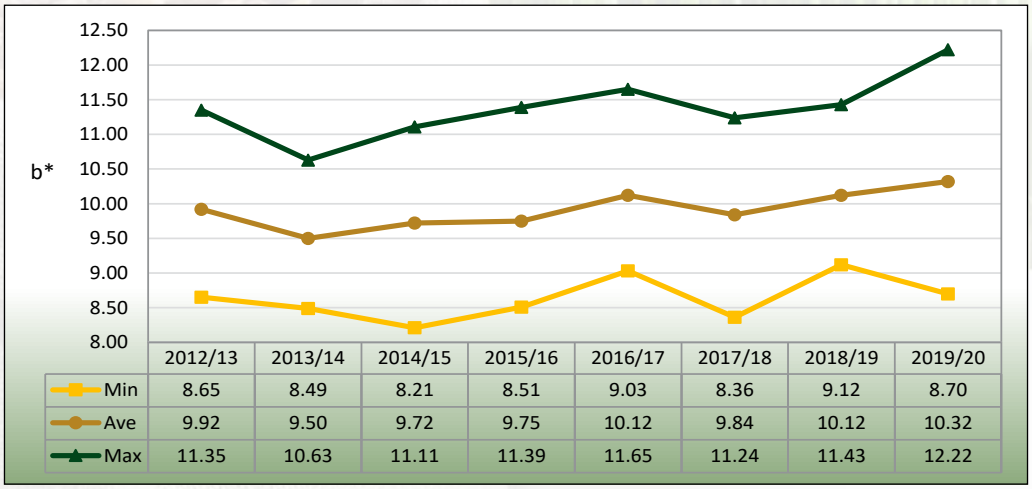
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Min	93.14	93.11	92.98	92.99	92.17	93.44	92.82	92.14
Ave	93.85	93.99	93.77	93.78	93.71	93.78	93.78	93.64
Max	94.39	94.59	94.30	94.40	94.30	94.24	94.43	94.30

Graph 23: Range of a* values over eight seasons



	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Min	0.26	0.29	0.22	0.06	0.34	0.30	0.32	0.32
Ave	0.41	0.40	0.44	0.47	0.46	0.43	0.45	0.47
Max	0.54	0.57	0.59	0.59	0.63	0.57	0.64	0.63

Graph 24: Range of b* value sover eight seasons



	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Min	8.65	8.49	8.21	8.51	9.03	8.36	9.12	8.70
Ave	9.92	9.50	9.72	9.75	10.12	9.84	10.12	10.32
Max	11.35	10.63	11.11	11.39	11.65	11.24	11.43	12.22

The average ash content was 0.64 % on a dry basis (moisture free basis), compared to the 0.60% of the previous season. According to the Wheat product regulations (Government Notice No. R. 405 of 5 May 2017), cake flour's ash content should not exceed 0.65%, white bread flour's ash content should be between 0.60 to 1.00% and that of all-purpose wheat flour between 0.55 and 0.75%.

The Rapid Visco Analyser (RVA) average peak viscosity of the samples analysed was 1852 cP (centipoise), the minimum viscosity 1407 cP and the final viscosity 2049 cP. Last season the values were 2218 cP, 1675 cP and 2516 cP respectively. The effect of sprout damage on the starch and gelatinisation properties of wheat samples were well illustrated this season. The analysis conditions were kept constant during all the analyses. Results are reported on a 14% moisture basis.

The wet gluten (14% mb) averaged 31.1% and the dry gluten, also on a 14% moisture basis, 10.6%. The previous season, these values averaged 30.1% and 10.1% respectively. The average gluten index value was 95 (94 last season), ranging between 79 and 99. The gluten index provides an indication of the gluten strength (higher being better) and is not influenced by the protein content. A value between 70 and 100 is generally accepted as good quality for pan bread baking purposes.

The farinograph analysis resulted in an average water absorption of 60.2% (60.5% the previous season) and an average development time of 5.4 minutes (5.0 minutes the previous season). The stability value of 8.1 minutes was one minute longer than the previous average. The mixing tolerance index equaled that of the previous season, namely 41 BU.

The average alveogram strength was 42.6 cm^2 and the average P/L value 0.60 (34.6 cm^2 and 0.81 the previous season). The distensibility of the dough increased on average compared to the previous season, indicating a more elastic dough. The stability value of 79 mm was slightly lower than the 82 mm of the previous season.

The average extensogram strength was 112 cm^2 (92 cm^2 previous season), confirming the stronger dough strength trend observed with the Alveograph. The maximum height in Brabender Units were also higher than last season (383 BU in 2019/20 and 350 BU in 2018/19). The average extensibility value increased as well, 211 mm this season compared to 191 mm the previous season.

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

Mycotoxin analyses were performed on 40 wheat samples, randomly selected to represent different regions as well as grades. The samples were tested by means of a SANAS ISO/IEC 17025 accredited multi-mycotoxin method using UPLC-MS/MS. With this technique simultaneous quantification and confirmation of Aflatoxin B_1, B_2, G_1, G_2, Fumonisin B_1, B_2, B_3, Deoxynivalenol, 15-ADON, HT-2 Toxin, T-2 Toxin, Zearalenone and Ochratoxin A is possible in one run.

Six samples tested positive for deoxynivalenol (DON) residues but still below the national maximum allowable level of 2 000 µg/kg for cereal grain intended for further processing. The average value of the six positive results was 300 µg/kg (ppb) and the highest value obtained 1 017 µg/kg. Last season, five samples tested positive for DON residues with an average value of 217 µg/kg (ppb), the highest value obtained was 361 µg/kg. Zearalenone (ZON) residues were detected on a wheat crop sample for the first time. A sample from the North West production regions reported a value of 29 µg/kg ZON. Please see the mycotoxin results in Table 7 on pages 67 and 68.

Amino acid profiles of local wheat were determined for the fourth season as part of this survey. Total amino acid analyses that included 18 amino acids namely Aspartic acid, Glutamic acid, Serine, Glycine, Histidine, Arginine, Threonine, Alanine, Proline, Tyrosine, Valine, Isoleucine, Leucine, Phenylalanine, Lysine, Tryptophan, Cystine and Methionine were performed on 35 samples, randomly selected to represent different regions as well as grades. Please see Table 8 on pages 70 and 71 for the results and page 79 for information on the methods followed.