Maize Crop Quality 2015/2016 - summary of results

RSA Grading

The maize crop was of good quality, with 72% of white and 78% yellow maize, graded as maize grade one, compared to 83% and 76% of the 2014/2015 season. The percentage total defective kernels above and below the 6.35 mm sieve, 6.2% for white and 5.7% for yellow maize, was respectively 0.9% higher and 0.2% lower than the previous season. The percentage defective kernels above the sieve increased slightly (0.3%) compared to 2014/2015, the percentage defective kernels below the sieve stayed the same (2.5%). The percentages Diplodia as well as Fusarium infected kernels were 0.1% lower and 0.3% higher than the previous season's 0.7% and 0.9% respectively.

Foreign matter (0.2%) and other colour maize (0.3%) did not pose significant problems, with only two white and yellow maize samples each, downgraded to class other due to foreign matter exceeding 0.75%. No samples were downgraded as a result of the presence of other colour maize. The average percentage combined deviations of white maize was 6.7% compared to the 5.8% of the 2014/2015 season, that of yellow maize was slightly lower, 6.0% compared to 6.2%.

Please refer to Table 5 on page 35.

USA Grading

Of the 920 maize samples graded according to USA grading regulations, 58% were graded US1, 22% US2, 10% US3, 5% US4, 2% US5, while sample and mixed grades represented 2% and 1% respectively. The percentage samples graded as US1 varies substantially over seasons, namely 58%, 64%, 42% and 79% over the last four seasons. The percentage samples graded as US2 was similar to the 23% of the previous season. The main reason for downgrading the samples was the percentage total damaged kernels exceeding the maximum limit per grade, followed by broken corn and foreign material.

Physical Quality factors

Bushel weight/Test weight is applied as a grading factor in the USA grading regulations, but is also routinely done at most intake points locally. White maize had an average test weight of 78.1 kg/hl compared to the 76.7 kg/hl of yellow maize. The test weight in total varied from 59.8 kg/hl to 83.9 kg/hl and averaged 77.3 kg/hl, equal to the previous season and the ten year average. Only 23 samples reported values below the minimum requirement (56.0 lbs or 72.1 kg/hl) for USA grade 1 maize, eight of these samples were from North West, seven from Mpumalanga, six from the Free State and one each from Gauteng and KwaZulu-Natal.

The 100 kernel mass averaged 32.1 g which is 2.3 g higher than the previous season and equal to the ten year average. As in previous seasons, white maize (32.4 g) averaged higher than yellow maize (31.8 g). The kernel size of white maize was similar to the previous season while yellow maize kernels were larger than the previous season. The percentage yellow maize kernels above the 10 mm sieve were on average 3.4% lower than white kernels and the percentage kernels below the 8 mm sieve 3.4% higher than that of white maize. The kernel sizes observed this season were some of the smallest the past ten seasons.

Both white and yellow maize were less susceptible to breakage than during the previous season. The percentage stress cracks observed varied from 0 – 31%, averaged 5% and was a percent lower than in the previous season. White and yellow maize both averaged 5%.

Please refer to Table 15 on page 53.

The milling index varied from 21.7 to 120.1 and averaged 95.5, 2.1 lower than the previous season. The average milling index for white maize is higher (99.0) than that of yellow maize (92.6).

Roff milling and whiteness index (WI)

The average % extraction of total meal in white maize obtained with the Roff mill averaged 78.4% (0.3% lower than the previous season) and varied from 71.8% to 86.4%.

The whiteness index averaged 26.1 for unsifted and 17.5 for sifted maize meal. Sieving the sample eliminates differences in the readings as a result of particle size. The whiteness index of the previous season averaged 22.9 for unsifted maize meal. Sifted maize meal averaged 14.9.

The higher the WI value obtained, the whiter the meal sample. The main contributing factors causing differences in WI values are the presence of other colour maize like yellow maize, the presence of defective kernels, the type of cultivar as well as the soil composition. The three samples with the lowest sifted whiteness index of values of -14.61, -9.30 and -7.41 this season, also had the highest percentages other colour maize ranging between 8.0% and 7.7%. The sample with the fourth lowest sifted whiteness

index value had the highest percentage total defective kernels, namely 91.3%.

Nutritional Values

The fat, starch and protein nutritional components are reported as % (g/100 g) on a dry base.

In general, white maize tends to have a higher fat content than yellow maize, but a lower starch content (except this season). No clear trend can be observed with regards to the protein content.

The average fat content of the 2015/2016 crop samples was 4.1%, equal to the previous season and 0.2% higher than the weighted ten year average. The average protein content of 9.7% was the highest since the 1995/1996 season and 0.3% higher than last season. The ten year weighted average is 8.8%. The starch content this season decreased on average by 0.4% compared to the previous season and is 0.3% lower than the ten year weighted average of 72.7%.

The fat content of white maize was 0.1% lower than the previous season, but 0.1% higher than the average of yellow maize (4.0%). The protein content of yellow maize equaled that of white maize at 9.7%. Yellow maize's protein content increased with 0.2% and that of white maize by 0.3%, compared to the previous season. The ten year weighted average of white and yellow maize is 8.8% and 8.9% respectively. The starch content of white maize is equal to the previous season's 72.6%. Yellow maize's starch content is 0.6% lower than in 2014/2015.

Please refer to Table 20 on page 66.

Genetic Modification (GM)

The SAGL screened 100 of the crop samples to test for the presence of the Cry1Ab, Cry2Ab and/or CP4 EPSPS traits. Important to remember is that the crop quality samples received by the SAGL are composite samples per class and grade, made up of individual deliveries to grain silos.

SAGL used the EnviroLogix QuickComb kit for bulk grain to quantitatively determine the presence of genetically modified maize.

The detection range for the Cry1Ab trait is 0.4% to 5%. 94% of the samples tested positive for Cry1Ab with values larger than 0.4% (Limit of quantification (LOQ)).

The detection range for the Cry2Ab trait is 0.5% to 5%. 78% of the samples gave values larger than the LOQ of 0.5% (positive results).

The detection range for the CP4 EPSPS trait is 0.25% to 5%. 99% of the samples tested positive for CP4 EPSPS with values larger than 0.25% (LOQ).

Values higher than 5%, the highest value of the detection range for all three traits, are reported as > 5%. This methodology has a precision coefficient of variation of 20%.

Please see Table 21 on page 68 for the results obtained as well as page 93 for a summary of the Events and Trade names/Brands represented by these three traits.

Mycotoxins

None of the 350 samples tested positive for Aflatoxin, Ochratoxin A, HT-2 or T-2 toxin residues.

The average Fumonisin level (Sum of B_1, B_2 and B_3) on all 350 samples tested, was 325 µg/kg (ppb) and ranged from 0 (not detected (ND)) to 11 347 µg/kg. This average is higher than the previous season's 224 µg/kg. Of the 350 samples tested, 200 samples (57%) tested positive for fumonisin levels and the average of these positive results was 569 µg/kg. The previous season, 56% of the samples tested positive, with an average of 397 µg/kg.

The highest Deoxynivalenol (DON) level detected was 1 585 µg/kg, compared to the 9 736 µg/kg of last season. The average level of all samples tested this season was 56 µg/kg, 183 µg/kg the previous season. 41% of the samples tested positive for DON last season compared to 21% this season. The average of the positive results decreased from 447 µg/kg in 2014/2015 to 259 µg/kg in 2015/2016.

Two percent of the samples tested positive for 15-acetyl-deoxynivalenol (15-ADON) residues. The average of the positive results was 163 µg/kg compared to 251 µg/kg in the previous season.

Zearalenone residues were found in 5% of the samples and values ranged from 0 (ND) to 127 µg/kg. The average of the positive samples was 49 µg/kg compared to the 60 µg/kg of the previous season when 11% of the samples tested positive.

Mycotoxin levels lower than the limit of quantitation (< LOQ) as well as limit of detection (< LOD) were seen as having tested negative for calculation purposes. Please see mycotoxin results in Table 22 on pages 76 to 87.