Crop Protection Division
Analysis of Plant Protection Products

The Southern African Grain Laboratory NPC

Quality is our passion

Services to the Agricultural Industry in South Africa and beyond

SAGNET WORKSHOP
WILLOWS COUNTRY LODGE
15 MAY 2017

WIANA LOUW – wiana.louw@sagl.co.za

SAGL – acting as reference laboratory for the grain and oilseed industry
An independent, ISO 17025 accredited testing laboratory
Registered as a Non Profit Company (NPC)

Marketing Control Boards dissolved – middle 1990s
The SAGL was established on request of the South African grain industry in 1997

Celebrating 20 Years of Excellence

SAGL
Southern African Grain Laboratory

Aim:

To deliver accurate quality analyses to the agricultural industry

Vision:

To be recognized as the market leader in grain and associated analysis in Southern Africa

Mission:

- ✓ To deliver market driven analytical laboratory services
- ✓ effectively / independently / trustworthy
- ✓ To stay ahead with technology
- ✓ To be internationally competitive
- ✓ To be financially independent

SAGL

Southern African Grain Laboratory

sanas

Testing Laboratory

T0116

SAGL's customer base:

Since 2016

Crop Protection Division

Crop Protection Division

The entire grain and oilseed value chain - different sectors represented on the Board of Directors

Production

Breeding

Research

SAGL

Southern African Grain Laboratory

Storage

Trading

AFMA SAFE FEED FOR SAFE FOOD Animal Feed Manufacturers Association

Processing: Baking, Milling & Animal Feed

= APPROXIMATE NUMBER OF METHODS PER LABORATORY – 84 IN TOTAL

= APPROXIMATE NUMBER OF TECHNIQUES

SAGL Southern African Grain Laboratory

Crop Protection Division
Analysis of Plant Protection Products

MANAGEMENT & ADMINISTRATION

8

CHEMICAL LABORATORY

1

6 + 1

±30

MILLING FACILITY

1

6

±22

RHEOLOGY LABORATORY

3

1

±10

NUTRIENTS & MYCOTOXIN LABORATORY

2

2

±12

CROP PROTECTION DIVISION LABORATORY

1 + 2

±10

±15

SANAS – SAGL IS A SANAS ISO 17025 ACCREDITED TESTING LABORATORY

CROP PROTECTION DIVISION – ISO 17025 AND OECD GLP

AFMA– SAGL COMPLY WITH AFMA'S CODE OF CONDUCT

ISO 17025 Accreditation

- ✓ Scope of accreditation covers **21** methods, representing **34** different parameters (Excluding Crop Protection Division)
  - ✓ Crop Protection Division – Flexible Scope Accreditation for HPLC, GC-FID and GC-MS (ISO 17025) and OECD GLP Compliance
- ✓ Operate under a comprehensive, well documented quality system applicable to accredited and non-accredited methods
- ✓ As part of our quality assurance procedures to demonstrate technical competency, SAGL participates in several different proficiency schemes:
- ✓ International: **AACCI, Bipea and FAPAS, AAPCO**
  National: **AgriLASA, NLA**

ISO 17025 Accreditation

- ISO 17025 accreditation since 1999 (only Crop Quality Division)

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South African National Accreditation System

CERTIFICATE OF ACCREDITATION

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

SOUTHERN AFRICAN GRAIN LABORATORY NPC
Co. Reg. No.: 1997/018518/08

Facility Accreditation Number: T0116

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

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

CHEMICAL AND PHYSICAL ANALYSIS

The facility is accredited in accordance with the recognised International Standard

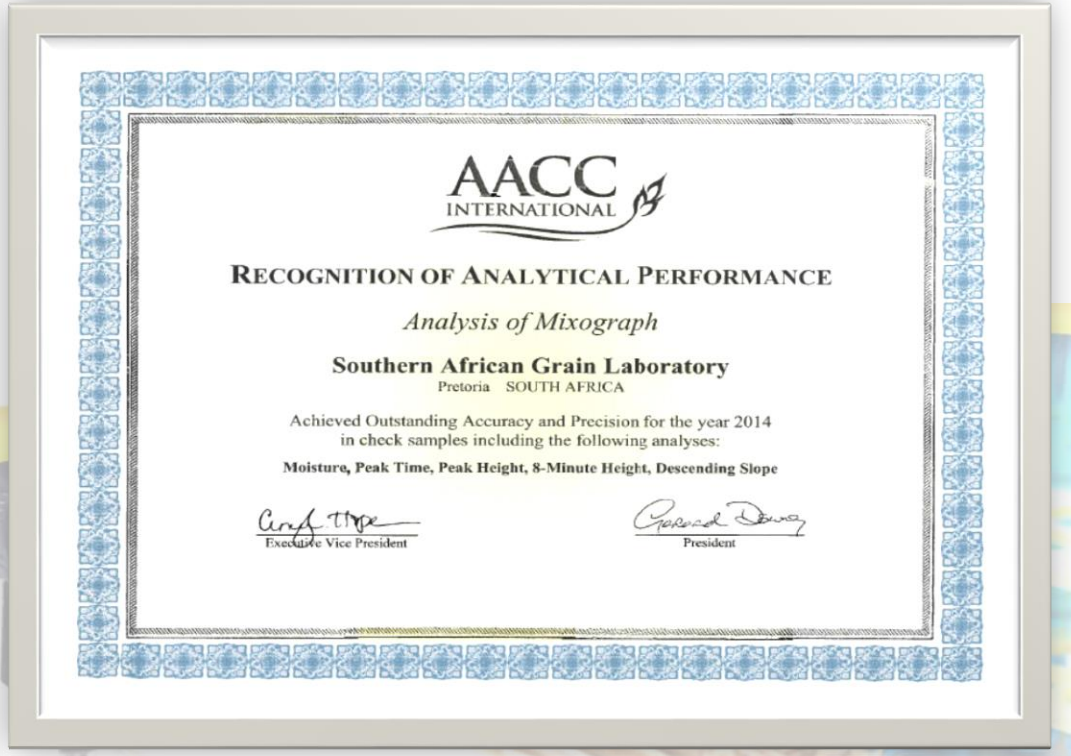
ISO/IEC 17025:2005

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

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

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

- International Accuracy Awards



AACC INTERNATIONAL

RECOGNITION OF ANALYTICAL PERFORMANCE

Analysis of Mixograph

Southern African Grain Laboratory
Pretoria SOUTH AFRICA

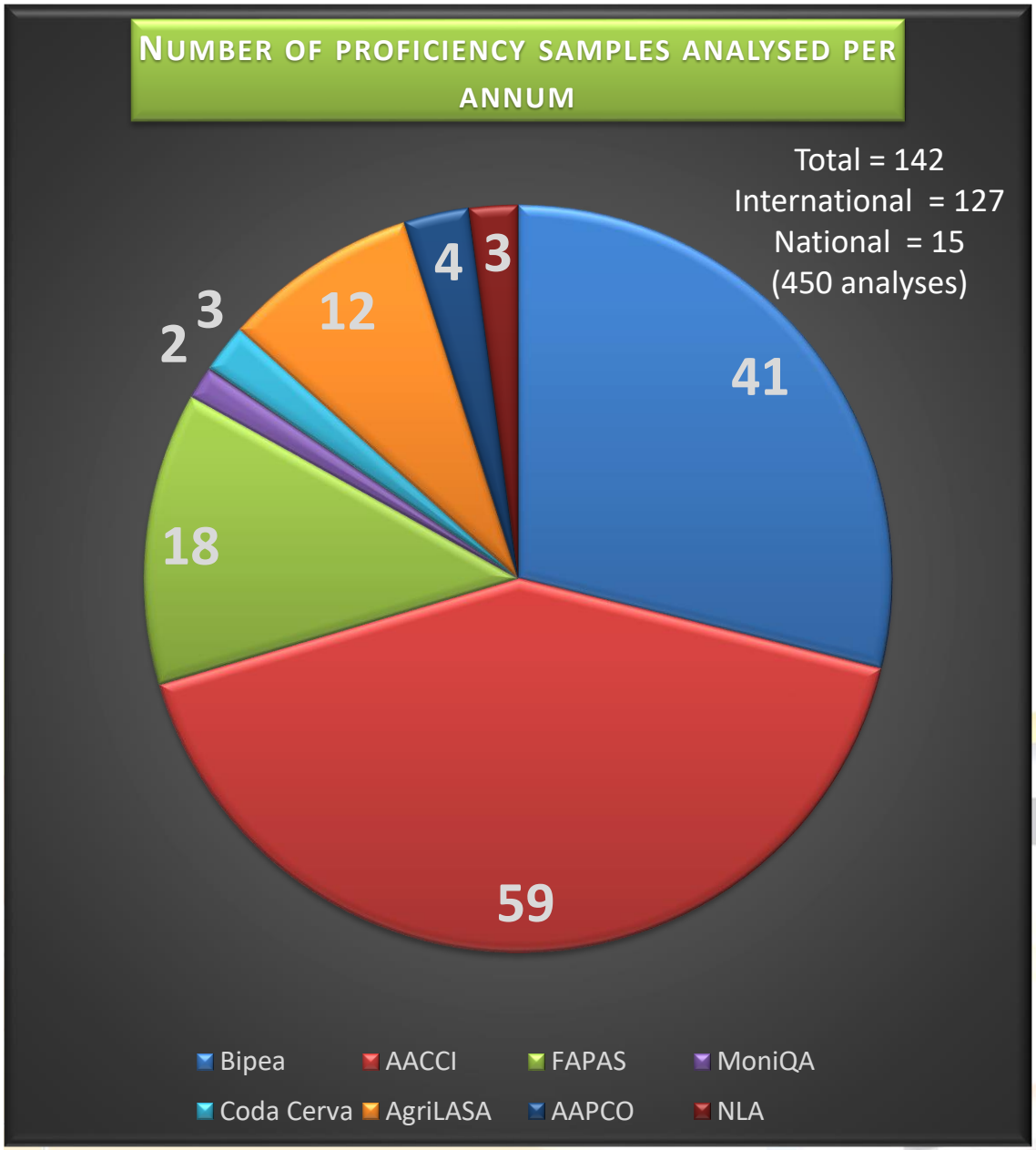
Achieved Outstanding Accuracy and Precision for the year 2014
in check samples including the following analyses:

Moisture, Peak Time, Peak Height, 8-Minute Height, Descending Slope

Executive Vice President

President

International benchmarking – accreditation under ISO/IEC 17025



Crop quality surveys on grain and oilseeds

Grain Sorghum
Since 2013

Sunflower seed
Since 2012

Soybeans
Since 2011

Maize
Since 1997

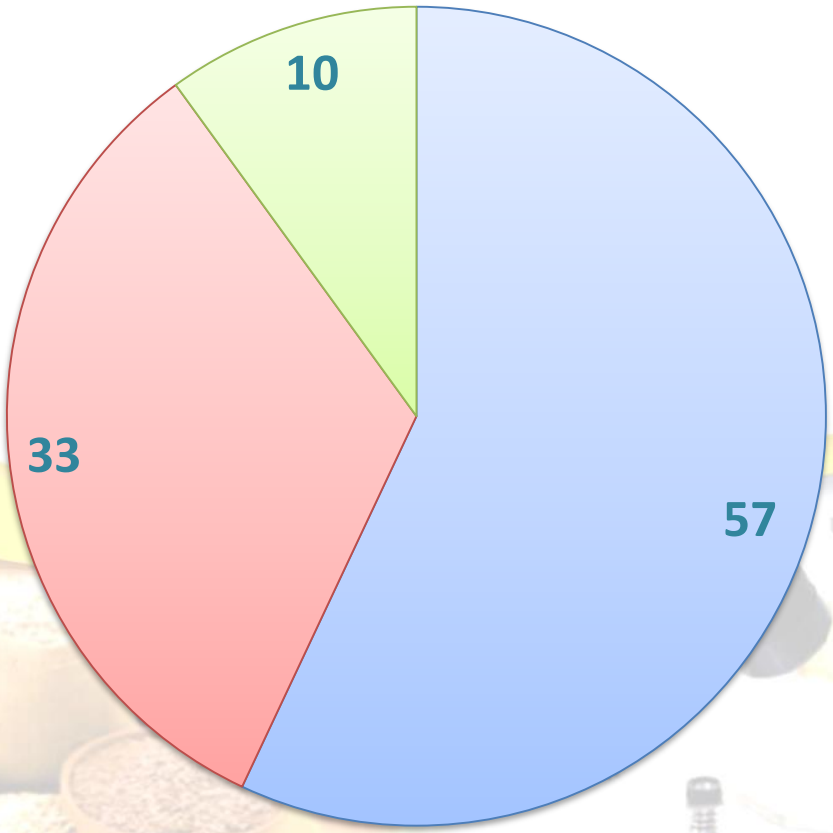
Wheat
Since 1997

CROP SURVEY REPORT FORMAT

- RESULTS: average, minimum and maximum per region
- Comparisons between production areas, regions and seasons in both table and graph formats
- REPORTS:
  - hard copy
  - downloadable in PDF format from the SAGL website
- Weekly web updates of Average results per region as it becomes available

METHODOLOGY SCOPE OF CROP QUALITY DIVISION -

FOCUSED ON GRAIN AND FOOD AND FEED RELATED PRODUCTS



- WHEAT
- MAIZE
- OTHER: SOYBEANS, SUNFLOWER, GRAIN SORGHUM, OATS, ANIMAL FEED, FOOD

EVALUATION OF NEW WHEAT CULTIVARS

TEST
Kg/hl (clean)
1000 kernel mass, g
Falling number, sec.
Protein (12%mb)
Extraction, %
Colour (KJ 76)
Break flour yield, %
MIXOGRAM
Peak time, min
FARINOGRAM
Absorption, %
Development time, min
Stability, min

TEST
BAKING TEST 100g
Corrected volume, cm^3
Dough characteristics
ALVEOGRAM
Strength, cm^3
Stability, mm
Distensibility, mm
P/L value

WHEAT AND MAIZE IMPORT QUALITY


ARGENTINA


AUSTRALIA


BRAZIL


CANADA


FRANCE


GERMANY


LESOTHO


LITHUANIA


POLAND


ROMANIA


RUSSIA


SWAZILAND


UNITED KINGDOM


UKRAINE


URUGUAY


UNITED STATES OF AMERICA

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QUALITY CONTROL

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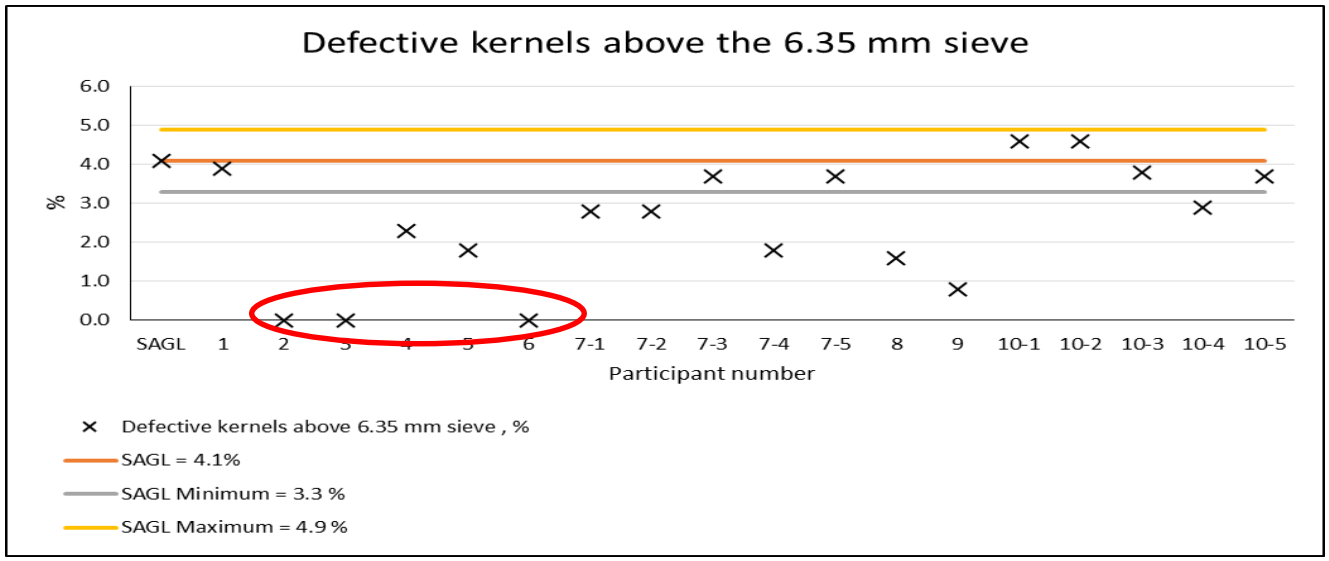
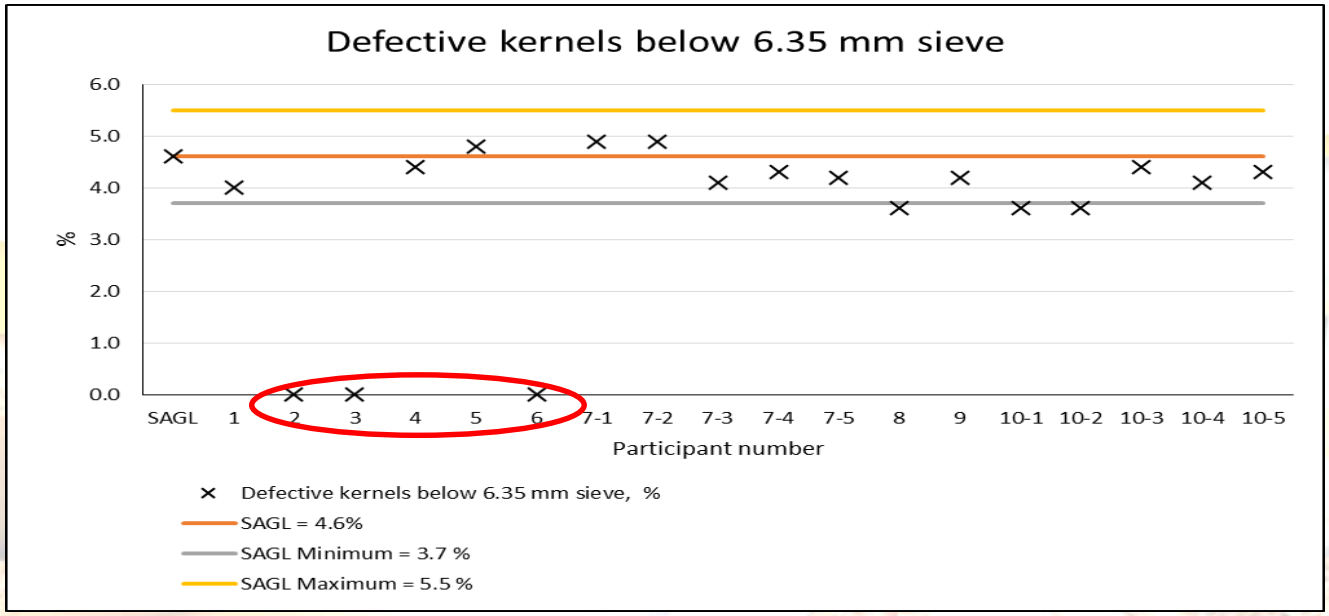
SAGL Proficiency scheme

Description	# per annum	Interval	Local	International	Participating countries	Total number of Participants
SAGL Annual Pre-harvest maize grading ring test	1	Per season	15	-	-	15
SAGL Annual Pre-harvest soybean grading ring test	1	Per season	20	-	-	20
SAGL Colour ring test	6	3 monthly	5	2	Lesotho & Namibia	7
SAGL Dry Colour ring test	6	3 monthly	8	-	-	8
SAGL maize grading ring test	4	Quarterly	9	2	Lesotho & Namibia	11
SAGL maize meal quality ring test	4	Quarterly	1	3	Swaziland, Lesotho and Namibia	4
SAGL Wheat and Flour ring test	4	Quarterly	18	9	Ghana, Nigeria, Lesotho, Swaziland, Namibia, Cameroon and Mauritius	27
SAGL Wheat Grading ring test	4	Quarterly	19	3	Lesotho, Namibia and Mauritius	22

EXAMPLE OF REPORT FORMAT – GRADING RING TEST





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LABORATORY TRAINING

- ✓ Laboratory technicians
- ✓ Supervisors
- ✓ Quality control managers
- ✓ Mill managers

FROM

South Africa, Nigeria, Zambia, Botswana, Mozambique, Kenya, Lesotho, Malawi, Ethiopia

INTERNSHIP PROGRAMMES

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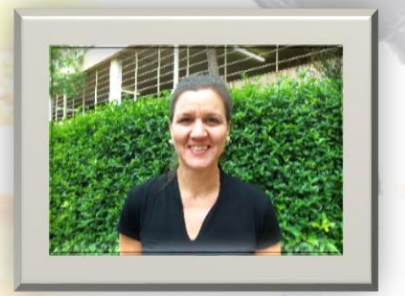
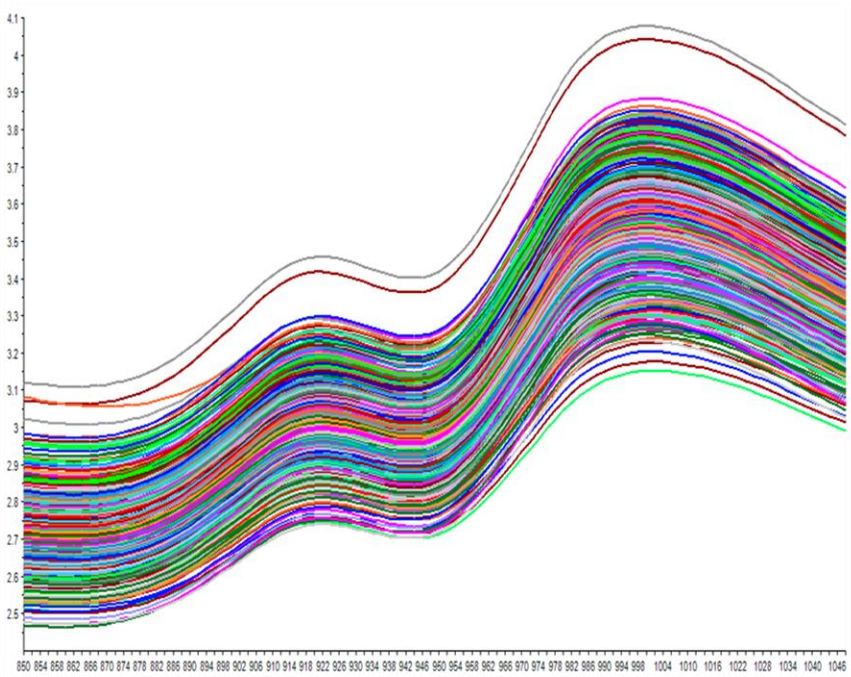
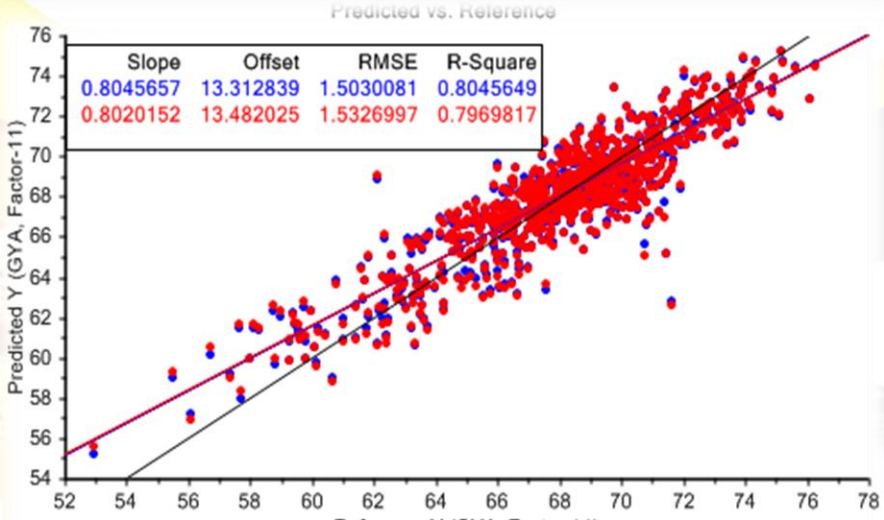
- ✓ Trust Bursary holders – 12 month internship programmes
- ✓ Technical and Academic University students involved in collaborative research projects
- ✓ Temporary laboratory assistants

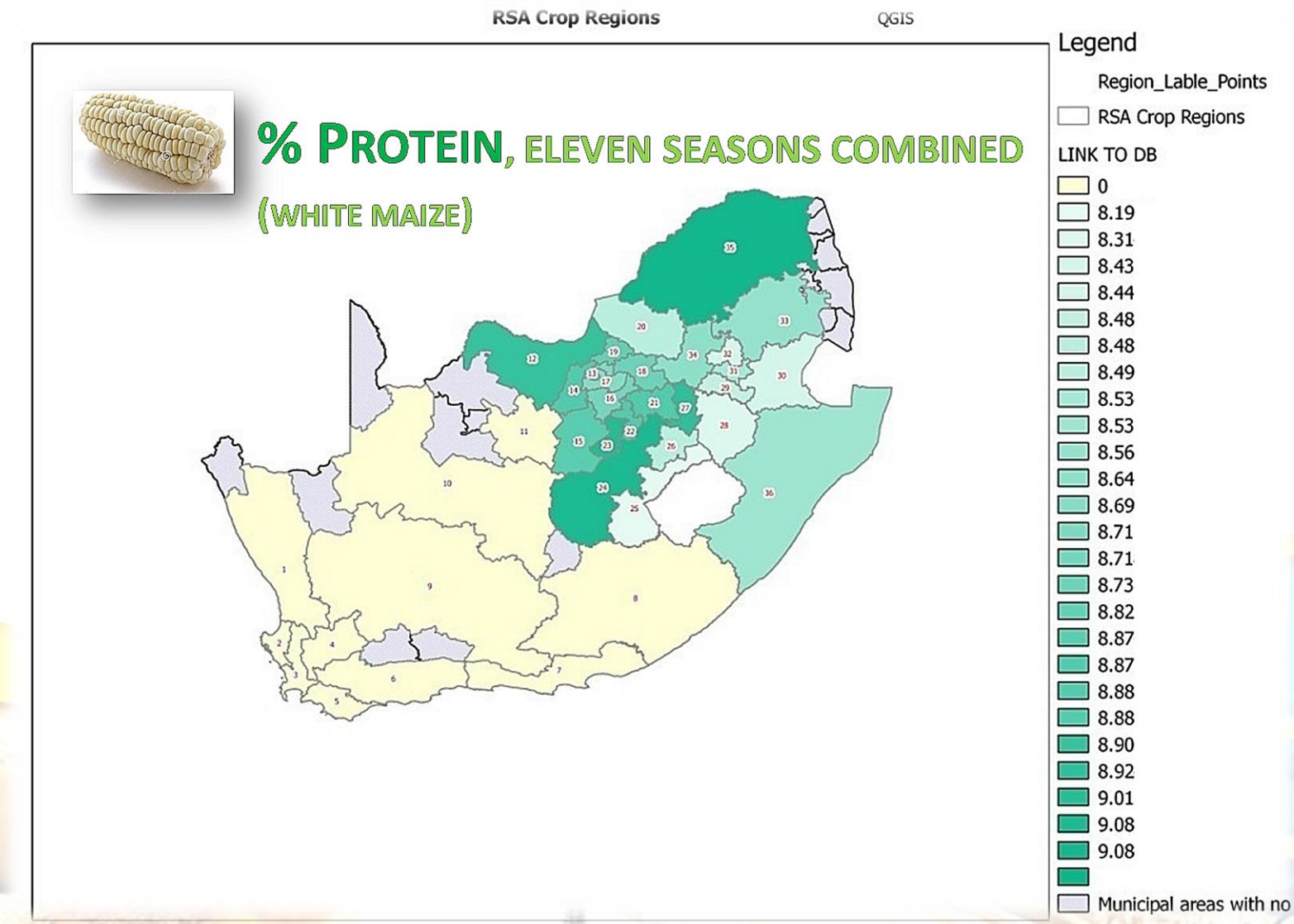
MILLING INDEX AS A PREDICTOR FOR MILLING PERFORMANCE





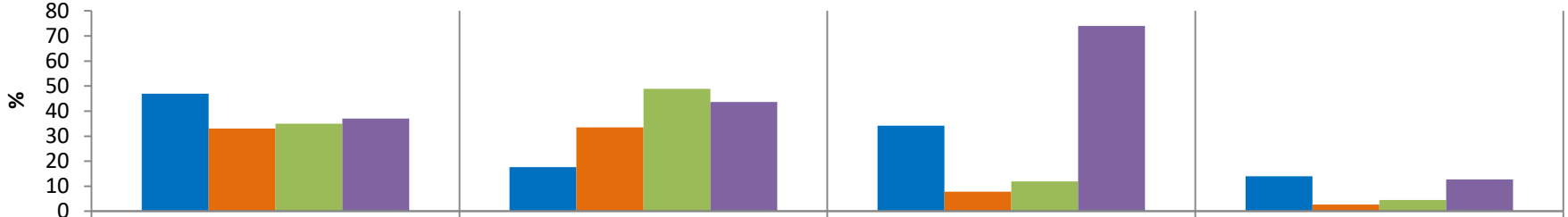
Data Mining of eleven years' Milling Index and Crop survey Results

Example of % Protein in white maize over eleven seasons



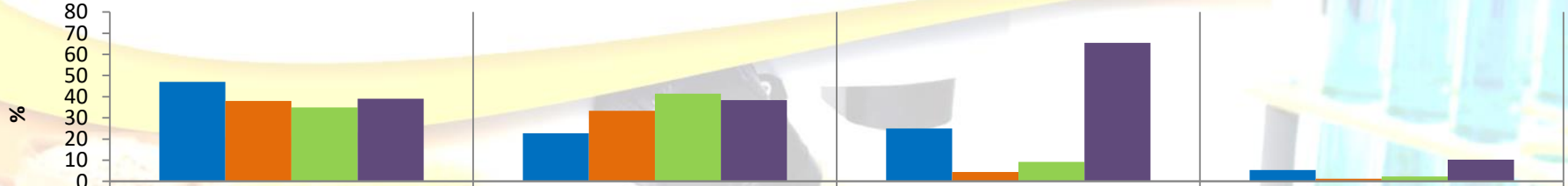
MYCOTOXIN MONITORING IN MAIZE – LOCALLY PRODUCED AND IMPORTED

% White maize samples with mycotoxins over 4 seasons



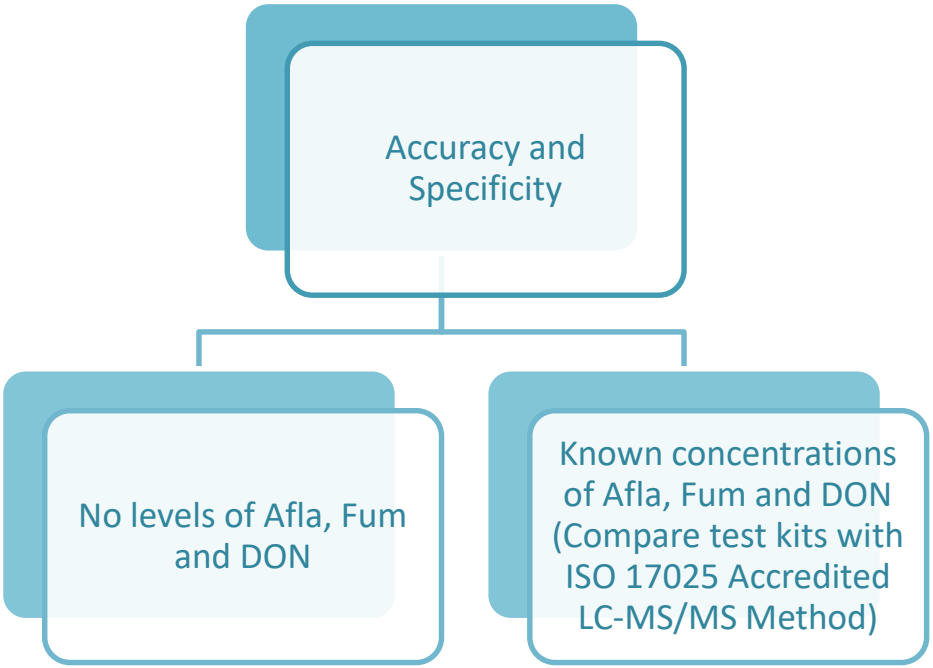
	% Samples tested	% Samples with FUM	% Samples with DON	% Samples with ZON
2010 - 2011	47	18	34	14
2011 - 2012	33	34	8	3
2012 - 2013	35	49	12	5
2013 - 2014	37	44	74	13

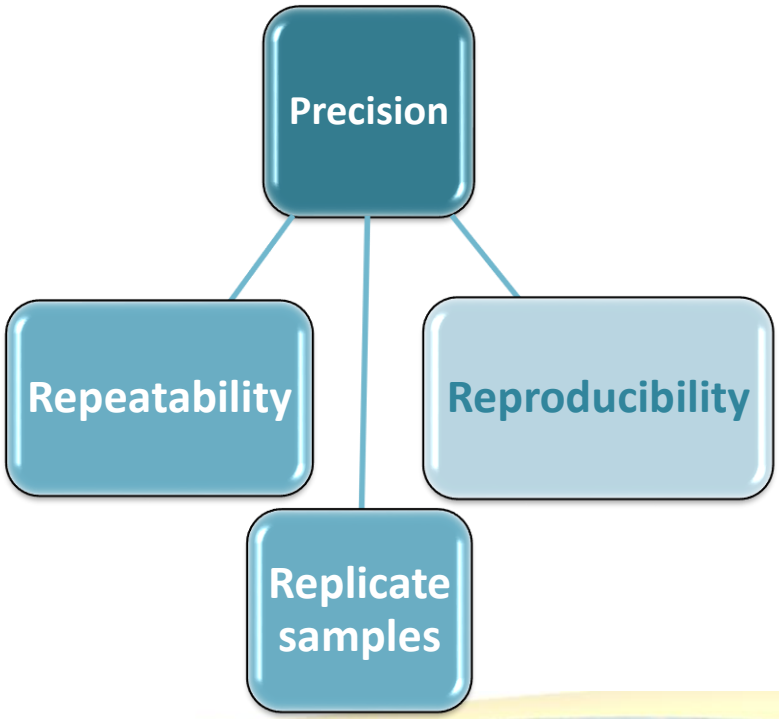
% Yellow maize samples with mycotoxins over 4 seasons



	% Samples tested	% Samples with FUM	% Samples with DON	% Samples with ZON
2010 - 2011	47	23	25	5
2011 - 2012	38	33	4	1
2012 - 2013	35	41	9	2
2013 - 2014	39	38	65	10

Mycotoxin monitoring in maize – evaluation of screening kits for non-laboratory environments





Mycotoxin	Concentration range	Maximum RSD (%) (GIPSA acceptance criteria 1,2,3)
Total Aflatoxin	5 – 100 µg/kg	25 -16
Total Fumonisin	500 – 5000 µg/kg	18 – 13
Deoxynivalenol	500 – 5000 µg/kg	20 -10

FORTIFICATION OF CEREAL GRAINS

- ✓ Micronutrient fortification of certain food matrices regulated in several countries – Vitamins and Minerals
- ✓ Quality control of micronutrient concentrations in the final product is important
- ✓ Monitoring on maize meal and wheat flour fortification compliance in South Africa
- ✓ Monitoring of wheat flour and vegetable oil – fortification compliance in Nigeria (GAIN funding)

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FORTIFICATION OF CEREAL GRAINS

- ✓ Vitamin A in flour as marker for fortification is analysed HPLC - dedicated laboratories, trained analysts at a relatively high cost
- ✓ Validation of I-Check equipment against HPLC as alternative for compliance monitoring
- ✓ **Conclusion** - The iCheck™ FLUORO method is well suited for quality control of fortified flour samples because of its simplicity, speed and accuracy

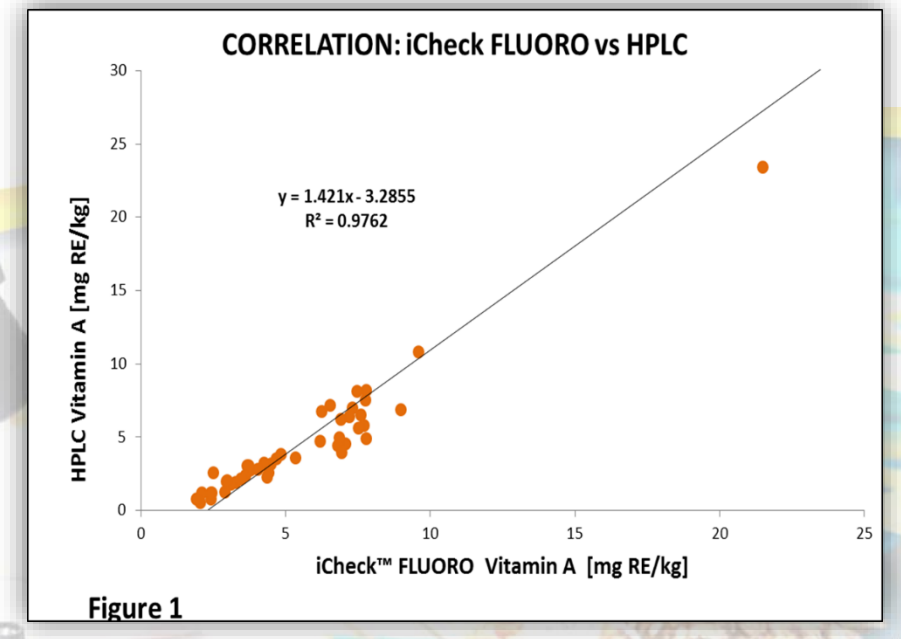


Figure 1

FORTIFICATION OF CEREAL GRAINS - CHANGING REGULATIONS

Wheat - testing

- Premix samples
  - Current → Tested 4 current premix samples
  - Proposed → Tested 3 proposed premix samples
- Unfortified flour
  - Cake Flour - 150 kg → 3 Batch fortifications – Proposed premix (3 x 20 kg)
  - White Bread Flour 200 kg + 20 kg bran
    - White bread: 4 Batch fortifications – Current & Proposed (2 x 2 x 20 kg)
    - Brown Bread: 4 Batch fortifications – Current & Proposed (2 x 2 x 20 kg)

Homogeneity testing

FORTIFICATION OF CEREAL GRAINS - CHANGING REGULATIONS

Wheat – Sensory Evaluation

Fortified cake flour and Bread loaves – Dept. of Food Science, University of Pretoria (UP):

Sensory Evaluation

- 2 x 6 cake flour bread loaves
- 2 x 6 white bread flour loaves
- 2 x 6 brown bread flour loaves
- Deliver 20 kg unfortified cake flour and 20 kg fortified cake flour to UP for non-bread applications → Dept. of Food Science, University of Pretoria - prepare non-bread products

Sensory Evaluation

Shelf life and Sensory Evaluation – Dept. of Food & Bio Technology, Tshwane University of Technology

- Deliver 20 kg unfortified & 20 kg fortified cake flour
- Deliver 2 x 20 kg fortified white bread flour
- 2 x 6 cake flour, white bread flour and brown bread flour loaves baked after 5 weeks shelf testing
- 2 x 6 cake flour, white bread flour and brown bread flour loaves baked after 10 weeks shelf testing

Sensory Evaluation

FORTIFICATION OF CEREAL GRAINS - CHANGING REGULATIONS

Maize Meal

- Premix samples
  - Current → Tested 4 current premix samples
  - Proposed → Tested 3 proposed premix samples
- Unfortified maize meal
  - Super maize meal 100 kg → 2 Batch fortifications – Current & Proposed premix (2 x 15 kg)
  - Special maize meal 100 kg → 2 Batch fortifications – Current & Proposed premix (2 x 15 kg)
- Fortified Super & Special maize meal – Dept. of Food Science , UP: Sensory Evaluation
  - 2 x 6 kg fortified super maize meal
  - 2 x 6 kg fortified special maize meal → Dept. of Food Science, UP Prepare pap
- Shelf life and Sensory Evaluation – Dept of Food & Bio Technology, TUT
  - Deliver 2 x 6 kg fortified super maize meal
  - Deliver 2 x 6 kg fortified special maize meal

Homogeneity testing

Sensory evaluation

Sensory evaluation

CROP PROTECTION DIVISION

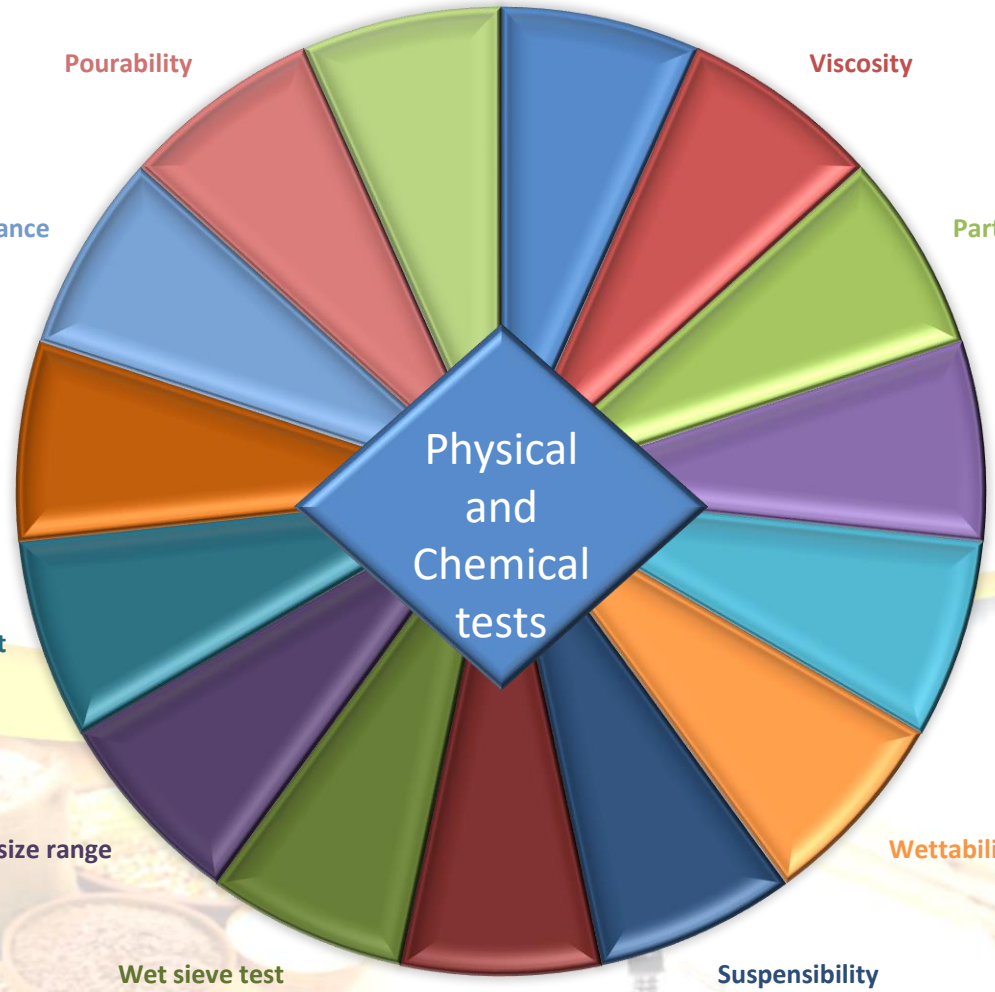
SINCE 2016

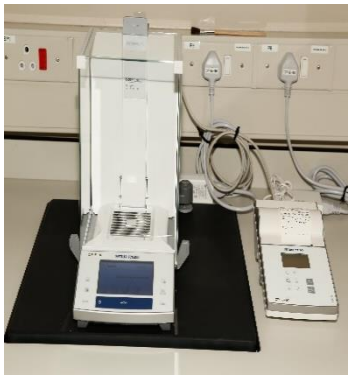
- Registration of pesticide formulations
- Data submitted to the Regulatory Authority (Act 36)
- Changes in requirements – test work to be performed under OECD GLP Principles and ISO 17025 Accreditation
- Shelf life testing

5-BATCH TESTING

- Concentration of active ingredient using HPLC, GC-FID
- Impurities – GC-MS

CROP PROTECTION DIVISION





THANK YOU FOR THE OPPORTUNITY AND PLEASE VISIT THE SAGL WEBSITE AT

www.sagl.co.za

FOR MORE INFORMATION