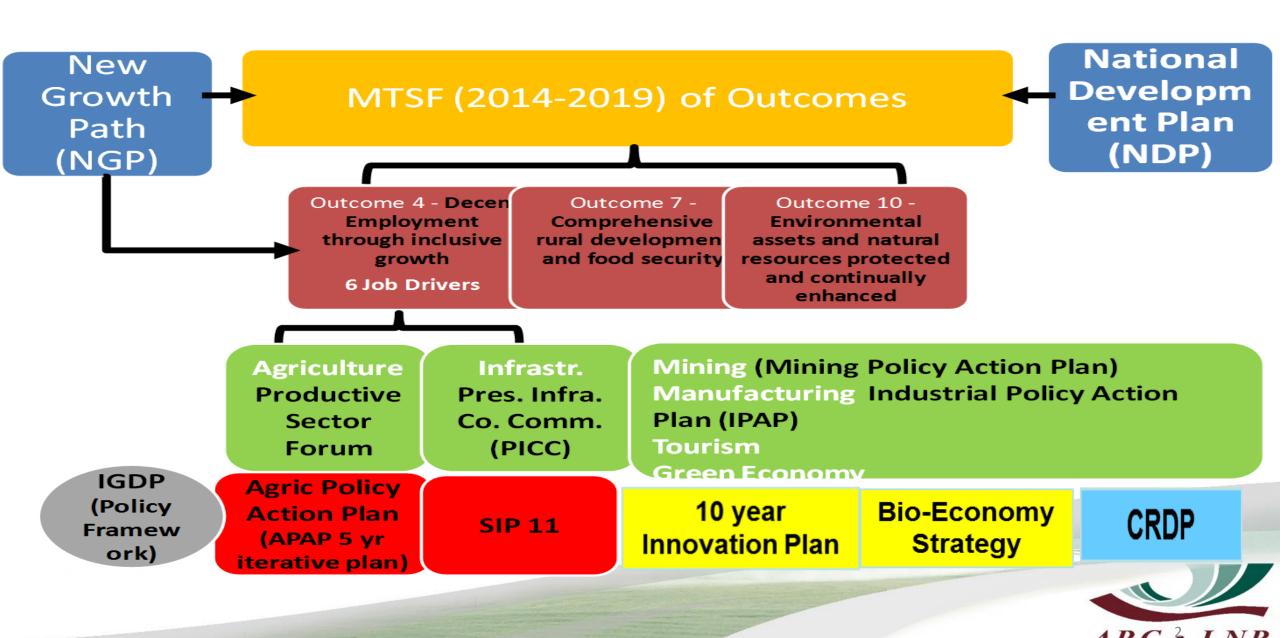


AGRICULTURAL RESEARCH COUNCIL ANNUAL REPORT

2016/17

ARC ALIGNMENT TO NATIONAL PRIORITIES AND POLICIES



ARC CONTRIBUTION TO NATIONAL PRIORITIES AND OUTCOMES

- 1. Supporting objectives of the National Development Plan, Vision 2030 through an ARC business strategy and organization structure aligned to national priorities;
- 2. Employment and Job creation, particularly among the poor;
- 3. Food and Nutrition Security for all, particularly within households;
- 4. Improved productivity, production, competitiveness and sustainability of animal and crop based agriculture;
- 5. Contributing to bio security;
- 6. Optimal technology platforms for agricultural production;
- 7. Strengthening the role of the bio economy (the "Farmer to Pharma Value Chain") to enable South Africa to become a leader in Biotechnology and related pharmaceuticals through our knowledge base;
- 8. Enabling the country to adapt and respond to climate change impacts (water, land, energy, sustainable natural resource utilization etc)
- 9. Contributing to South Africa's Global and Regional positioning and integration; and,
- 10. Ensuring an optimal and sustainable organization.

ARC STRATEGIC GOALS

- 1. To generate knowledge and technologies that will enhance the efficiencies in crop based agriculture;
- 2. To generate knowledge and technologies that will enhance the efficiencies in livestock based agriculture;
- 3. To generate knowledge and technologies for the conservation and utilisation of natural resources;
- 4. To generate knowledge, solutions and technologies for food safety, quality and improved efficiencies in the agriculture value chain;
- 5. Translate research outputs in order to generate knowledge, facilitate decision making and contribute to the transformation in the agriculture sector; and
- 6. Apply resource management practices, towards a high performing and visible organisation.



ARC TRANSLATING SCIENCE FOR AGRICULTURE ECONOMY

SCIENCE COUNCIL

- Innovation in science
- Basic/fundamental research
- Applied research (technologies)
- Intellectual assets
- Skilled scientists & engineers
- Volume & quality publications
- Scientist ratings
- Number of PhDs
- Number of doctoral fellows
- Number of postdoc fellows
- Scientific awards

AGRICULTURE DEVELOPMENT

- Economic link to Innovation
- Applied research
- Technology Transfer/dissemination
- Intellectual Asset Use
- Agricultural Production & productivity
- Food Security hunger
- Environmental Sustainability
- Import Substitution
- Export Promotion
- Agrarian Transformation
- New products (vaccines, cultivars etc)



ARC PROGRAMMES

- 1. Crop Production, Improvement and Protection
- 2. Animal Health, Production and Improvement
- 3. Natural Resources Management
- 4. Mechanisation and Engineering
- 5. Agro-processing, Food Technology and Safety
- 6. Smallholder Agricultural Development
- 7. Agricultural Economics and Commercialization
- 8. Training and Extension
- 9. Administration and Corporate Affairs



STRATEGIC GOAL 1

To generate knowledge and technologies that will enhance the efficiencies in crop based agriculture

FOCUS OF GOAL

- a) Broaden the food base for food and nutrition security and welfare.
- b) Optimised crop production systems to mitigate agricultural risks.
- c) Improved cultivars (food and non-food) through breeding, physiology and genetics.
- d) Enhanced crop protection systems.
- e) Crops and mixed production systems developed for smallholder farmers.

OUTCOMES WITH ASSOCIATED IMPACT

- 1. New cultivars that would ensure higher profitability
- 2. Mitigation strategies against biotic and abiotic stresses that would improve productivity
- 3. Sustainable production systems
- 4. Reduction in post harvest losses
- 5. New products and processes developed from primary agriculture



BREEDING HIGH QUALITY PEARS FOR A WARMER CLIMATE

- ARC integrated plant breeding programme ensures that South Africa remains one of the world leading exporters of top quality pears.
- Blushed pear selections suitable for warmer climates are highly sought after in the market.
- Pears in South Africa are the third largest fruit crop after grapes and apples

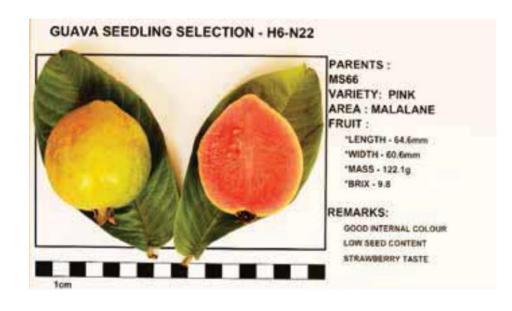






ARC'S GUAVA BREEDING PROGRAMME FACILITATES EXPANSION OF GUAVA INDUSTRY

 ARC is collaborating with industry (Guava Producers Association) and has established new and promising selections in the Western Cape to facilitate industry expansion







NEW DROUGHT TOLERANT & INSECT PROTECTED MAIZE HYBRIDS TESTED ON-FARMS

- The ARC through the WEMA project developed five drought-tolerant and insect-protected (Bt – MON 89034) TELATM hybrids, namely:
 - ✓ WE6206B
 - ✓ WE6207B
 - ✓ WE6208B
 - ✓ WE6209B
 - ✓ WE6210B
- Twenty-six TELATM hybrids demos were planted on-farm in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape and North West.
- These demons were used to host information days to introduce the hybrids to extension officers and farmers, as well as to demonstrate correct way of planting refuge (a strip of maize crop without Bt-gene)







NEW DROUGHT TOLERANT & INSECT PROTECTED MAIZE HYBRIDS TESTED ON-FARMS

 During the information days, 517 x 2kg promotional seed packs of these hybrids were given to smallholder farmers in Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North West.

 An invasion of the fall army worm was experienced in most Provinces and these Bt maize hybrids were found to be resistant.



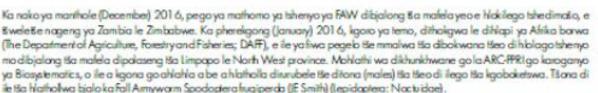




ACCURATE MORPHOLOGICAL IDENTIFCATION OF FAW & DEVELOPMENT OF FACTSHEETS



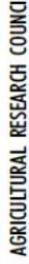
borwa.



Sexusibele (FAW) se se fala bonolo moyeng o moritihi, se na le potologo ya baphelo bjo bakopana (go tloga leeng go fihla serurubeleng), ebile se Nasela maloko a mmalwa a dibialo. Go le bido, serurubele se, se belle maemo a ekonomi katsing e kgolo ga balemi. Yana e beliwe sehiopheng sa disenyi tše arotšweng (A.1. Quarantine) lenaneong la molgahlo wa tšhiseletšo ya dibijalo ya Europe le Mediterranean (Europe and Mediterranean Florit Protection Organisation, EPPO), bjaloke sesenyi seo se araganiswena mo no Afrika Barwa.







SUCCESSFUL SMALL GRAINS NATIONAL CULTIVAR TRIALS RESULT IN PRODUCTION GUIDELINES

 All the data collected in the three National Cultivar Adaptation Programmes (Winter Rainfall, Summer Rainfall and Irrigation) were processed successfully, and the information was reported at the annual meeting of the National Cultivar Workgroup and four Production Guidelines for Small Grain Production (Afrikaans and English) for both the Winter Rainfall and Summer Rainfall areas were published and distributed to producers throughout South Africa. These guidelines were already available on ARC's website (www.arc.agric.za/arc-sgi) during the first week of March 2017, and this is the earliest these guidelines have ever been available to producers.





PRODUCTION SYSTEMS IN CHANGING CLIMATE

- The Western Cape in South Africa is currently in the middle of the worst drought that region has seen in many years, following a temporal relieve of the worst drought that affected the rest of South Africa. As result, Western Cape Province, where ARC campus for deciduous fruit research (ARC – INFRUITEC) is situated has huge water restrictions. The ARC research trials in the field, in glasshouses, as well as those based in laboratories have been negatively affected in many ways.
- ARC scientists have demonstrated that it is possible to use diluted winery wastewater for irrigation.
- Research by ARC scientists on hydroponic production of tomatoes indicates that it is possible to utilize production systems that enhance nutritional value of tomatoes.





STRATEGIC GOAL 2

To generate knowledge and technologies that will enhance the efficiencies in livestock based agriculture

FOCUS OF GOAL

- a) Development of Animal Vaccines
- b) Development of Diagnostic and Analytical Technologies
- c) Improvement to Veterinary Public Health
- d) Development of Disease Control Strategies
- e) Development and Introduction of new traits and genetic diversity in animals
- f) Enhance animal production and nutrition technologies
- g) Animal, crop and mixed production systems developed and transferred to smallholder farmers
- h) Animals and mixed production systems developed for smallholder farmers

OUTCOMES WITH ASSOCIATED IMPACT

- 1. High quality improved meat and dairy products that are safe, highly nutritional with visual appeal;
- 2. Affordable meat and dairy products;
- 3. Disease free herds (livestock & wildlife);
- 4. Reduced degradation of rangelands;
- 5. Improved livestock production through adoption of improved rangeland management
- 6. Effective animal breeding methods/techniques
- 7. Increased efficiency of livestock production from breeding
- 8. Improved livelihoods among smallholder farmers
- 9. Reduced number of stock theft incidents
- 10. Disease and residue free animal products for increased market access

Research on Vaccines, Vaccine Production and Provision of Analytical Services

- Continued to produce blood vaccines marketed by OBP against:
 - Erlichiocia
 - Anaplasmosis
 - Babesiosis
- Research into new generation vaccines continued especially on diseases like:
 - PPR
 - Sheep pox
 - Goat Pox
 - Rift Valley Fever
 - Lumpy skin disease
- Continued to provide analytical services to DAFF for exports of meat products to Europe:
 - Continued export of these products is dependent on passing the EU inspection mission

Soft and Hard Ticks that transmit diseases







Argasidae



HEARTWATER – AN ECONOMICALLY IMPORTANT DISEASE

- Caused by: Rickettsial (Ehrlichia ruminantium)
- Affects: Ruminants (wild & domestic)
- Transmitted by ticks: (Amblyomma; A. hebraeum)
- Mortality rate high (up to 90 %) in susceptible animals (per-acute, acute)





HEARTWATER VACCINE – PROGRESS TO DATE

ACHIEVED:

- 1. The effective application of the intramuscular route of vaccine inoculation in animals replacing the previously established intravenous injection making the procedure easy to use by farmers.
- 2. Vaccine safety and efficacy in goats, sheep, cattle
- 3. Optimization of vaccine dose for goats, sheep, cattle
- 4. Duration of immunity in sheep
- 5. Reversal of vaccine strain to virulence (no reversion)
- 6. Vaccine dispensing Standard Operating Procedures

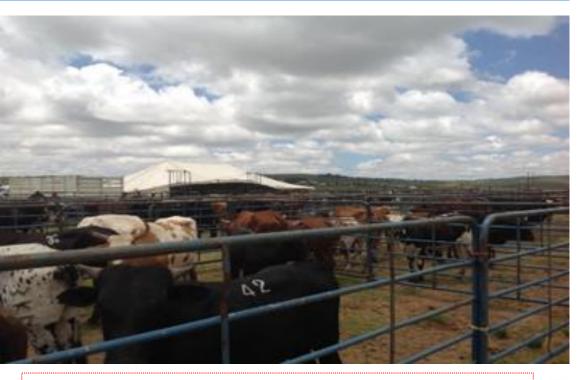
FURTHER DEVELOPMENT (CURRENT)

- a) Vaccine up-scaling in conjunction with OBP
- b) Quality control of the vaccine before it gets it is approved for sale and distribution
- c) Development of registration dossier



ENABLING MARKET ACCESS THROUGH SCIENTIFIC SERVICES

Cattle presented for auction at Inquthu in Mzimkhulu Municipality in rural KZN on the 2nd December 2016



Total number presented = 52

Total number sold = 47

Average price / head = R5 783.40

Total revenue from auction sale = R276 076

 Kaonafatso ya Dikgomo (KyD) is a special purpose vehicle aimed at accelerating participation of smallholder producers into the mainstream livestock industries

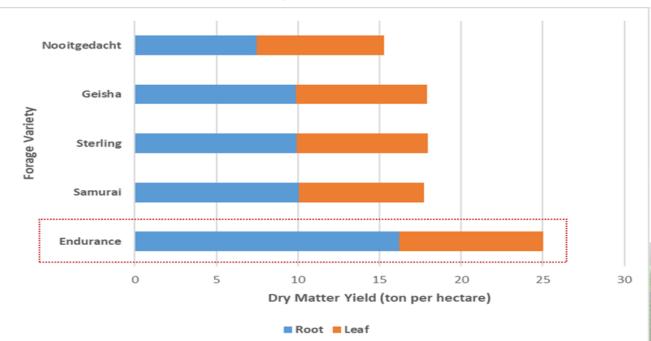
Key achievements include:

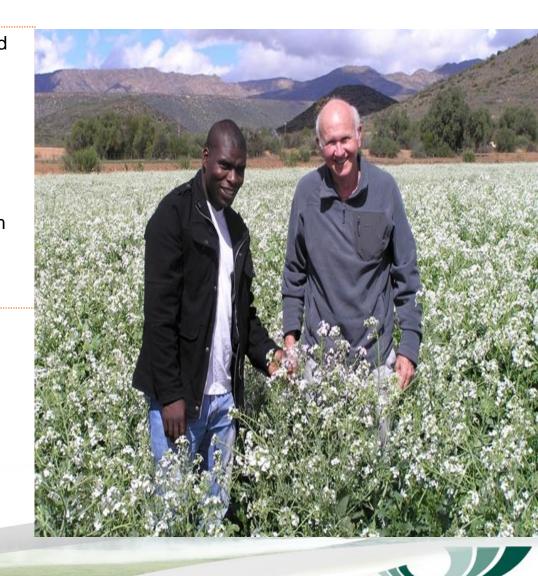
- 1. Improved access to scientific services
 - » 8 404 smallholder farmers received scientific support
- 2. Improved access to markets
 - » Execution of cattle auction sales in rural areas in partnership with provincial departments of agriculture
- 3. Commercialisation of smallholder farmers
 - » Participants in KyD venturing into intensive production systems such as feedlots.



BREEDING FORAGES FOR INCREASED ANIMAL PRODUCTIVITY

- ARC Forage Breeding Group at Cedara successfully bred a new forage variety named Endurance
- Endurance is a dual-purpose crop with:
 - high-yielding roots and leaves for animal consumption
 - its soft leaves are considered very palatable for use as mfino/morogo
- Breeding of forage cultivars is a painstakingly slow process:
 - Initial crossing trial: crossing of a unique late-flowering fodder radish line (from New Zealand) and ARC's two soft-leafed fodder radish cultivars "Geisha" and "Sterling".
 - Selection and breeding trial: 8 years of annual selection and breeding





STRATEGIC GOAL 3

To generate knowledge and technologies for the conservation and utilisation of natural resources

FOCUS OF GOAL

- a) Alternative energy technologies
- b) New and improved conservation agriculture systems
- c) Climate Smart agriculture to enable mitigation and adaptation to climate change
- d) Improved water management and irrigation practices
- e) Natural resources monitored and characterised
- f) Genetic resources, databases updated and maintained
- g) Green technologies and processes to mitigate impact of agriculture on the environment
- h) Enhanced mechanization in agriculture
- i) Agriculture engineering

OUTCOMES WITH ASSOCIATED IMPACT

- 1. Climate smart agriculture technologies adopted & utilized that sustainably increase agricultural productivity and incomes;
- Increased resilience of Agriculture to climate change;
- 3. Reduced greenhouse gas emissions;
- 4. Optimal agricultural production from increased biodiversity
- 5. Water efficient agriculture
- 6. Energy efficient agriculture
- 7. Optimal utilization of land for sustainable agriculture
- 8. Appropriate infrastructure for increased, efficient and sustainable agriculture



ENABLING AGRICULTURE RESILIENCE TO CLIMATE CHANGE



- South Africa mild winter conditions
- Chilling Requirement for dormancy release not met for most apple cultivars
- Prolonged Dormancy Symptoms (PDS):
 - Delayed foliation/extended rest
 - Reduced branching Lateral vegetative budbreak absent or irregular
 - Terminal buds open more later or not at all
 - Less synchronised breaking of buds and fruit ripening
- Dormancy breaking chemicals
 - Expensive, labour intensive
 - Pose a Health and Environmental risk
 - Usage now banned





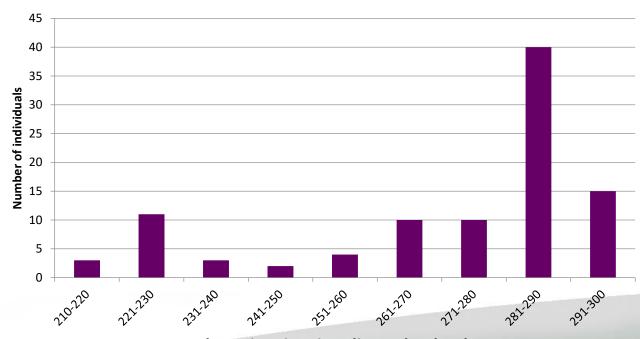
High Chilling Requirement Lady Williams



APPLES: LADY WILLIAMS & ANA POPULATIONS

- F1 outbred cross
- 98 Individuals
- Difference in Initial Budbreak from lowest to highest: 75 days

Lady Williams x Anna population flowering time



Flowering time in Julian Calendar days



KEY ISSUES TO UNRAVEL RESPONSES TO CLIMATE CHANGE

- 1. Enabling full use of genetic yield potential under sub optimal conditions
- 2. Early maturing varieties to escape the heat and drought
- 3. Resilience of pollen viability to stress
- 4. Water use efficiency rooting systems and evapotranspiration
- 5. Nitrogen use efficiency
- 6. Breeding for higher temperature optimum
- 7. Introduction of genetic diversity through use of crop wild relatives etc



STRATEGIC GOAL 4

To generate knowledge, solutions and technologies for food safety, quality and improved efficiencies in the agriculture value chain

FOCUS OF GOAL

- New food and non-food processes and products developed.
- Food science and technology developed for improved product quality and yield.
- Post-harvest losses reduced.
- New animal products developed.
- Agroprocessing, biotechnology and informatics each cross-cutting across different areas of the agricultural value chain and intended to be applied to the full value chain of crops, animals and agricultural system research.

OUTCOMES WITH ASSOCIATED IMPACT

- Develop process to create products from indigenous crops
- Product yield, product quality and safety.
- Product development and value adding (storage, processing and packaging).
- Additional research focus areas include indigenous and high value products (indigenous herbal teas, medicinal and aromatic plants, fruits vegetables) to access niche product value chains.
- Provision of scientific services to farmers and clients of the ARC.
- Animal agriculture research groups conduct research primarily investigating the various factors involved in producing good quality meat, meat products and milk and milk products (safe, appealing, nutritious, affordable and tasteful).
- Research into the processes involved in maximising yield without forfeiting quality and adding value to a basic product to increase quality and/or yield.

STRATEGIC GOAL 5

Translate research outputs in order to generate knowledge, facilitate decision making and contribute to the transformation in the agriculture sector

FOCUS OF GOAL

- a) ARC technologies packaged and exploited
- b) Established and functional agri incubators
- c) Animal, crop and mixed production systems transferred to smallholder farmers
- d) Agriculture Development Centres that are delivering services. ARC footprint and visibility enhanced
- e) Smallholder farmer enterprises support
- f) Agricultural skills and capacity developed
- g) Agriculture research for development outcomes communicated and disseminated
- h) Marketing and stakeholder management

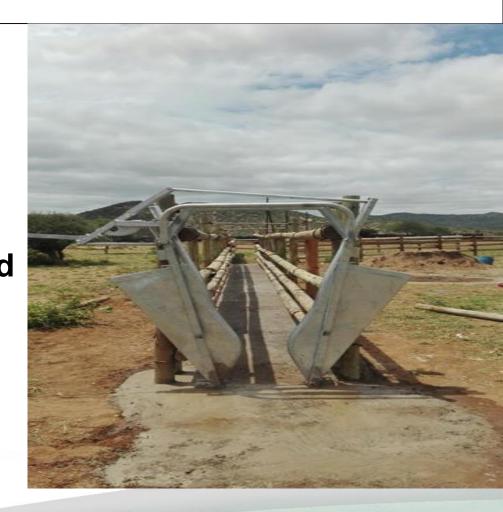
OUTCOMES WITH ASSOCIATED IMPACT

- 1. Increased adoption and use of ARC technologies among smallholder farmers
- 2. Increased number of functioning and sustainable agriculture enterprises from agri incubators
- 3. Increased number of animal, crop and mixed production systems transferred to smallholder farmers
- 4. Agriculture Development Centres established in all provinces
- 5. Competitive and sustainable Smallholder enterprises
- 6. Increased skills base and capacity in agriculture sector
- 7. Increased use of and application of agriculture science and technology in decision making
- 8. Improved image and relations of ARC with stakeholders



SMALLHOLDER AGRICULTURAL DEVELOPMENT

- 1. 5 474 Smallholder Farmers trained (7000 Livestock and 4474 Crops and Natural Resource Management)
- 2. 821 Extension Officer trained, including Animal Health Technicians, NGOs and Researchers to conduct Extension effectively
- 3. More than 9 577 Scientific Services rendered to smallholder farmers including Animal Health Diagnostics, Soil & Water Analysis, Plant Health, and Feasibility Studies and KyD
- 4. Infrastructure (dip tanks, crush pens and auction facilities) development and resulted in the revitalization of communal areas an improved incomes



Strydskraal Crush pen.



IMPACT ANALYSIS OF ARC CONTRIBUTIONS TO AGRICULTURE

- ARC released 96 peach and nectarine cultivars since 1937
- Tree planting density increased by 57% to 956 trees/ha
- ARC cultivars used for 45% nectarine exports, 100% canned peaches

- 16 of the top 39 plum cultivars exported from SA are ARC bred
- Every R100 invested in plum research in ARC returns R114
- 67 000t of plums produced annually,
 49 000t exported.











STRATEGIC GOAL 6

Apply resource management practices, towards a high performing and visible organisation

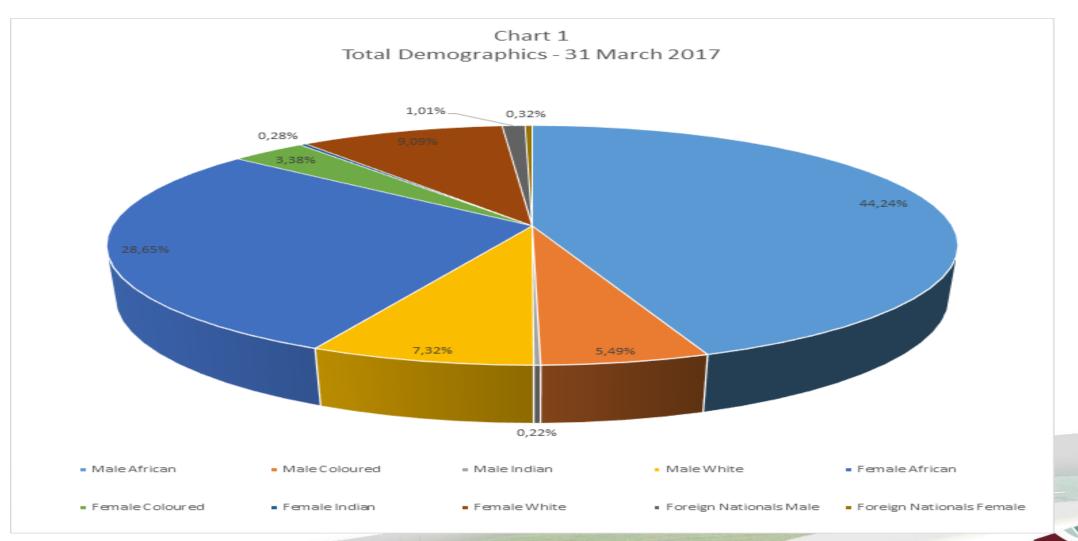


HUMAN RESOURCES

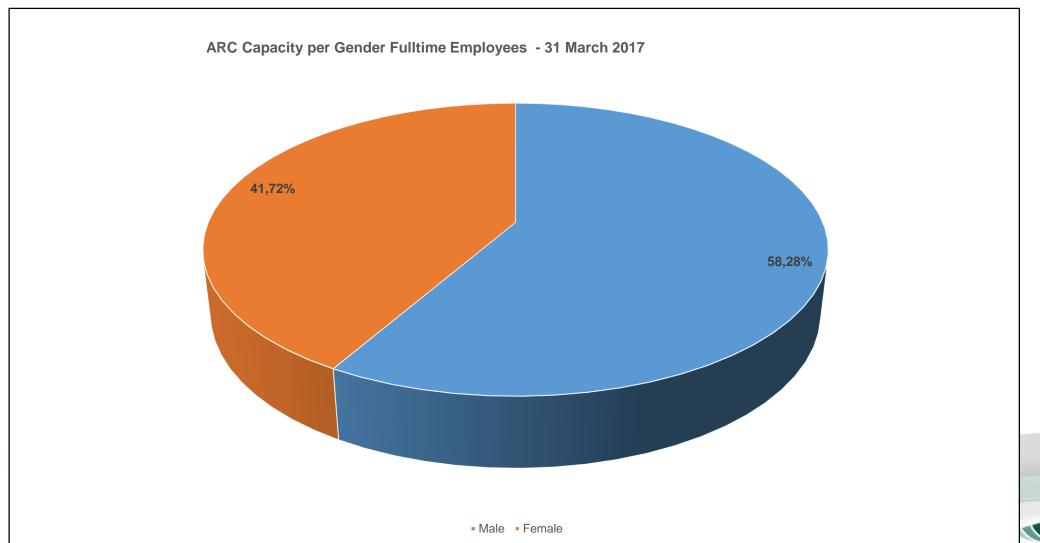
An important asset for the sustainable success of ARC



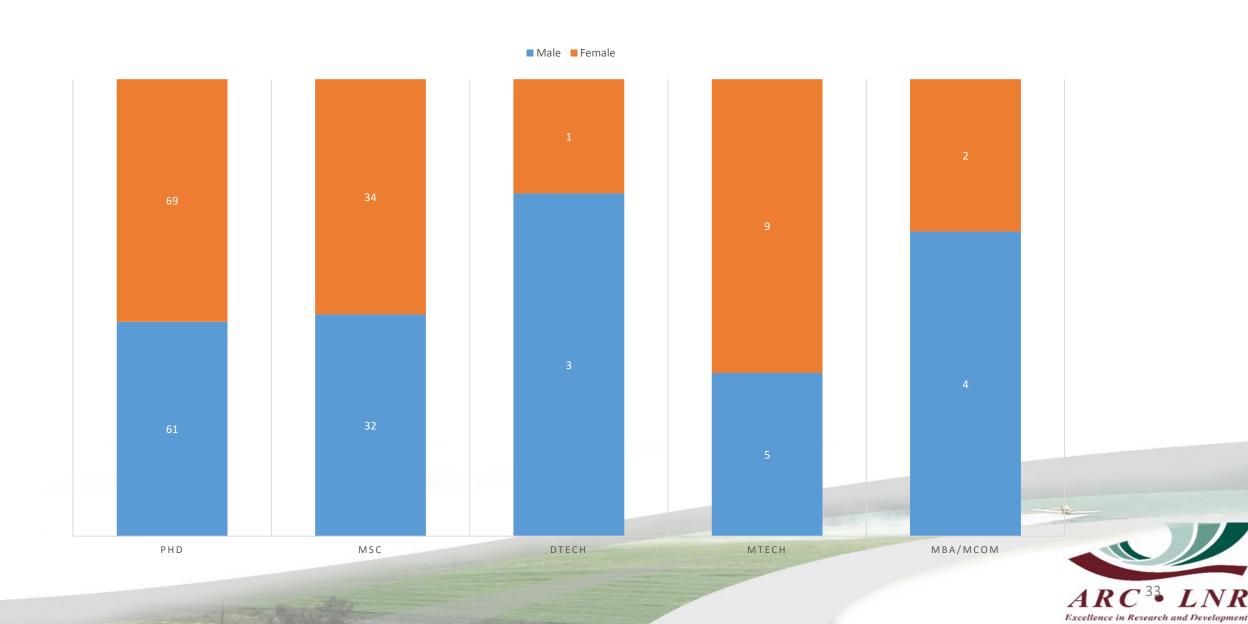
EMPLOYMENT EQUITY



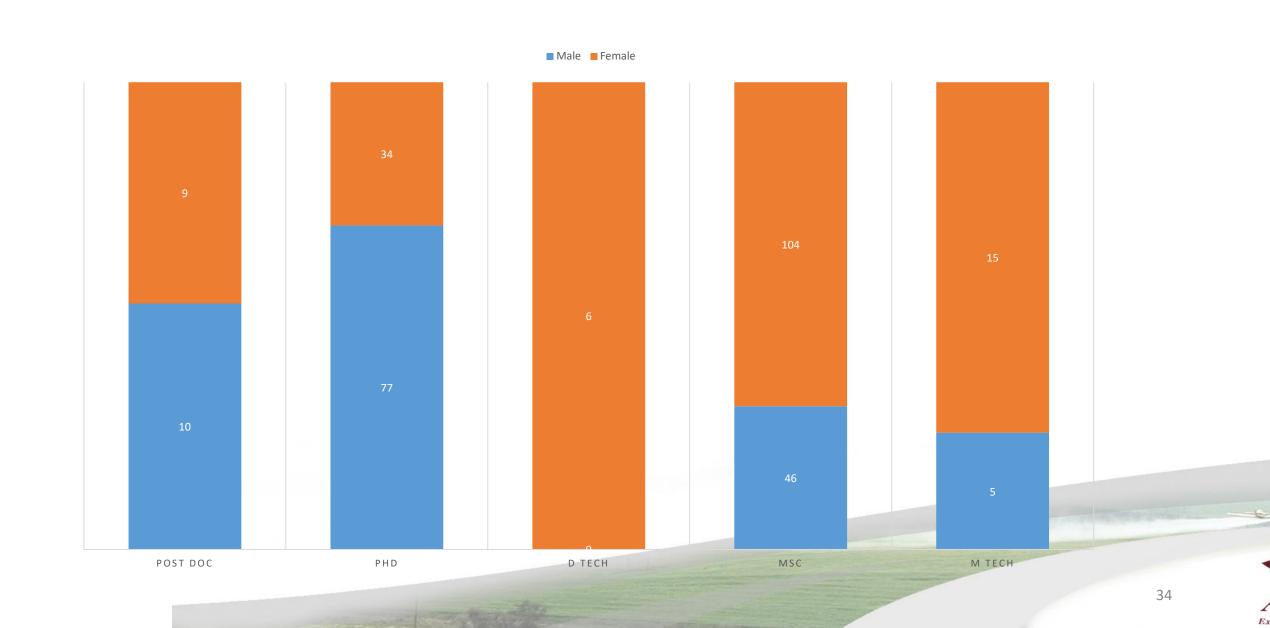
EMPLOYMENT EQUITY



FULL TIME EMPLOYEES FORMAL TRAINING



ARC PROFESSIONAL DEVELOPMENT PROGRAM



ICT AND INFRASTRUCTURE

Effective management of physical assets



HIGHLIGHTS

- 1. Transfer of properties approved, pursuant to asset management plan implementation
 - 1. Lochlomond Primary School at SGI, Bethlehem process in progress with Free State Provincial department of Basic Education;
 - 2. Boikhutsong Primary School at OVR, Onderstepoort process in progress with Gauteng Provincial department of Basic Education;
- 2. Growth in rental income from surplus capacity of over 7% excluding annual escalations;
- **3. Consolidation** completed relocation of Rietondale staff and assets to main PPR campus at Onderstepoort after completion of the new quarantine facility. Rietondale site officially handed over to Public Works; this initiative also has cost-saving impact (security, maintenance, utilities, etc);
- 4. Completed acquisition and installation of emergency power systems / generators at selected campuses to mitigate the risks associated with irregular power supplies and impact on research;
- 5. Security services deployment on 3-year cycle completed this has seen a gradual reduction in security incidents at ARC campuses, which often have an adverse impact on ARC research activities, material and other forms of costly damage to property



HIGHLIGHTS

- 1. Video-conferencing solution for far-flung ARC campuses as a work efficiency (reduced travel time, bringing remote multiple participants together into meetings) and cost-reduction intervention (costs associated with intra-campus travel);
- 2. Full deployment of the SANREN network connectivity across 11 of the 12 ARC main sites, with improved quality, availability, reliability, capacity and proportionately lower cost per megabyte of communication;
- 3. Knowledge and collaboration platforms development
 - Agromet this is a tool used for reporting long-term graphical comparative weather data specifically by the institute for Soil Climate and Water (ISCW);
 - Collaboration Workspaces and Portals these are internal virtual workspaces on the ARC intranet that enable either common interest participants, departments or committees to share information and/or collaborate on document development;
- 4. Research & development initiatives
 - Germplasm Resource Information Network (GRIN) implemented at the Small Grains Institute, with further implementations earmarked for later; the system holds information from Genebanks, enabling efficient and effective global network of Genebanks to permanently safeguard plant genetics resources vital to global food security.



SUMMARY OF ARC FINANCIAL PERFORMANCE

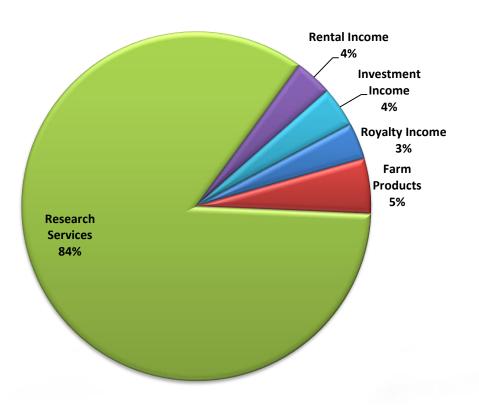
	2016		2017
	R'm		R'm
Revenue	1,249	4%	1,197
Parliamentary Grant	787	4%	759
External Income	461	5%	438
Operating Expenditure	1,317	3%	1,283
Capital Expenditure	102	16%	86
Cash Flow from Operations	(104)	13%	(118)
Net Cash inflow (Outflow)	(207)	1%	(204)
Cash Balance	302	68%	97
		A SAME OF THE PARTY OF THE PART	100

SUMMARY OF ARC FINANCIAL PERFORMANCE

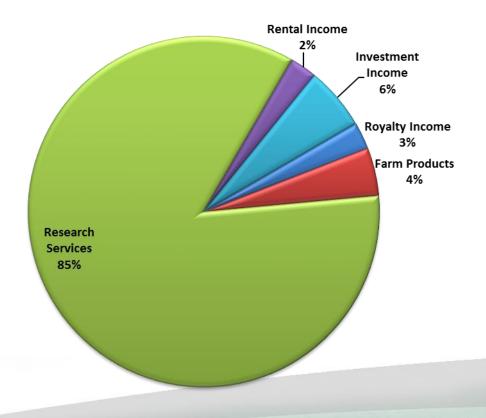
Financial Performance	2017 R'm	2016 R'm	Var. %
Parliamentary Grant	759	787	(4%)
PG - Operational	652	662	(1%)
PG - Ring-fenced Projects	19	43	(55%)
PG - Capex	87	83	5%
External Income	422	435	(3%)
Other Income	16	27	(39%)
Total Revenue	1,197	1,249	(4%)
Operating Expenditure	1,283	1,317	3%
Personnel Costs	744	768	3%
Other Operating Costs	496	509	3%
Depreciation & Impairment	43	40	(5%)
Surplus/(Deficit) for the year	(86)	(68)	(26%)

EXTERNAL INCOME 2017 vs 2016



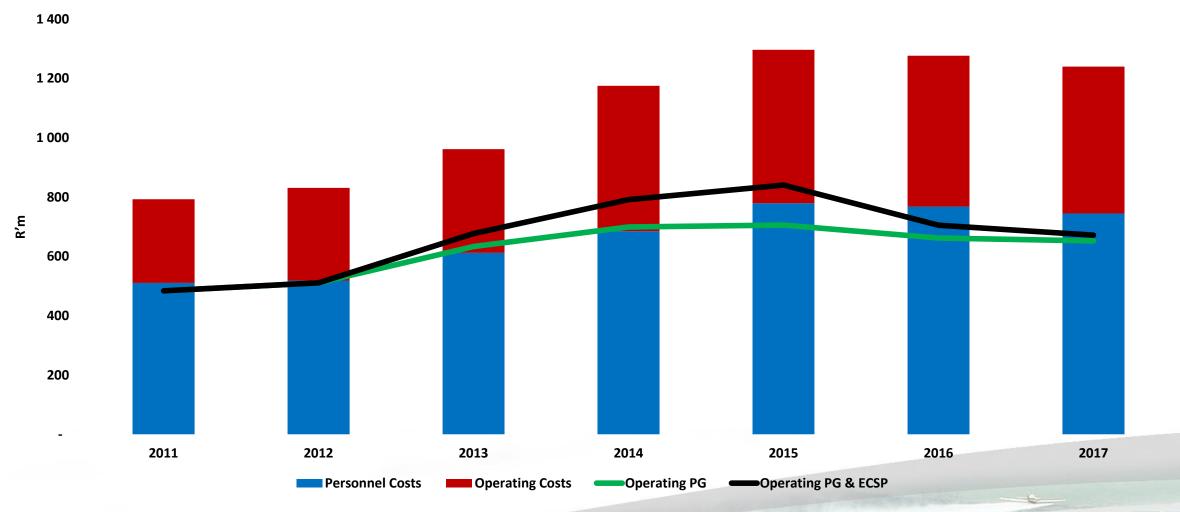


2016 - R461m



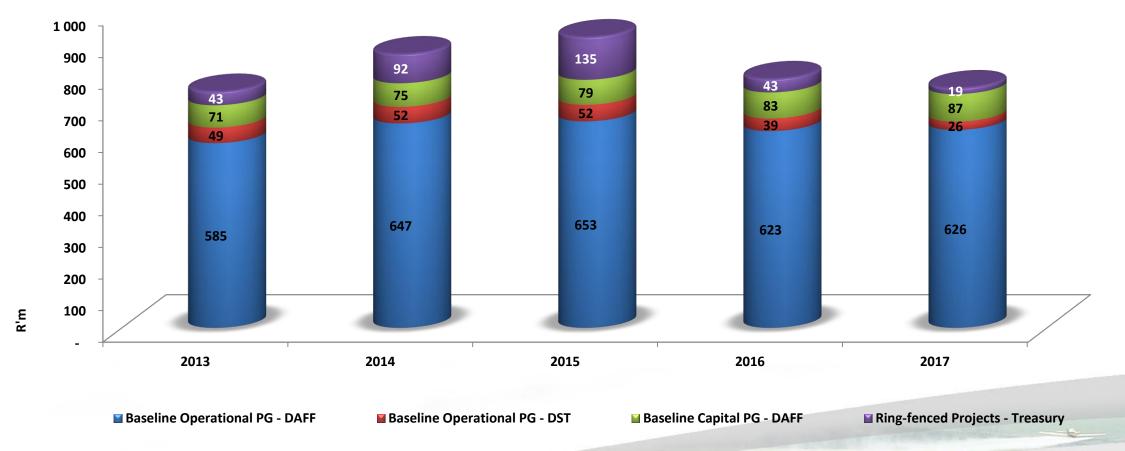


OPERATING PARLIAMENTARY GRANT vs OPERATING COSTS



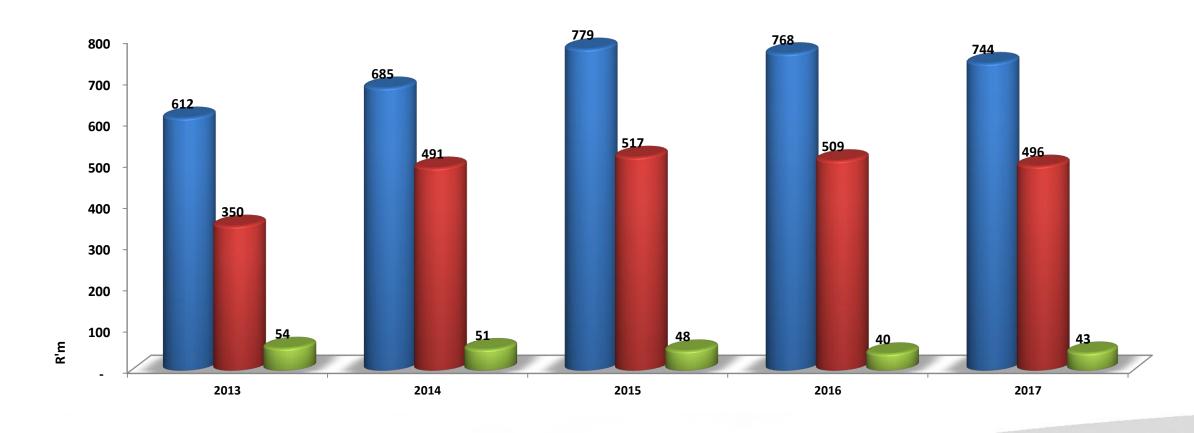


PARLIAMENTARY GRANT 5 YEARS





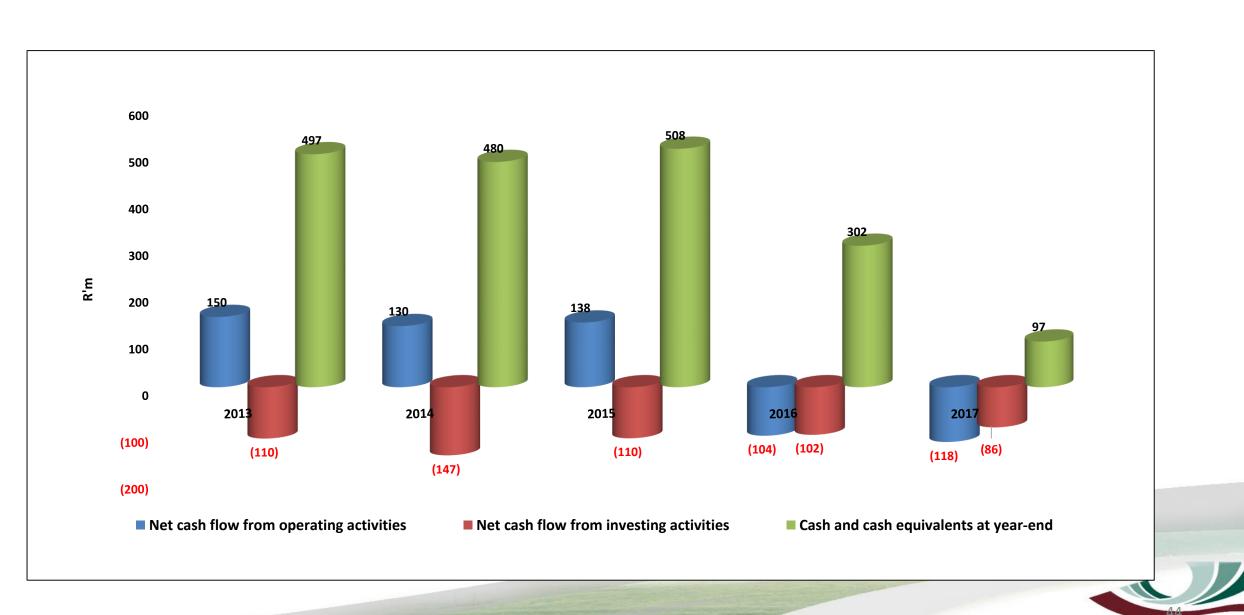
OPERATING COSTS 5 YEARS







CASH SURPLUS/ SHORTAGE

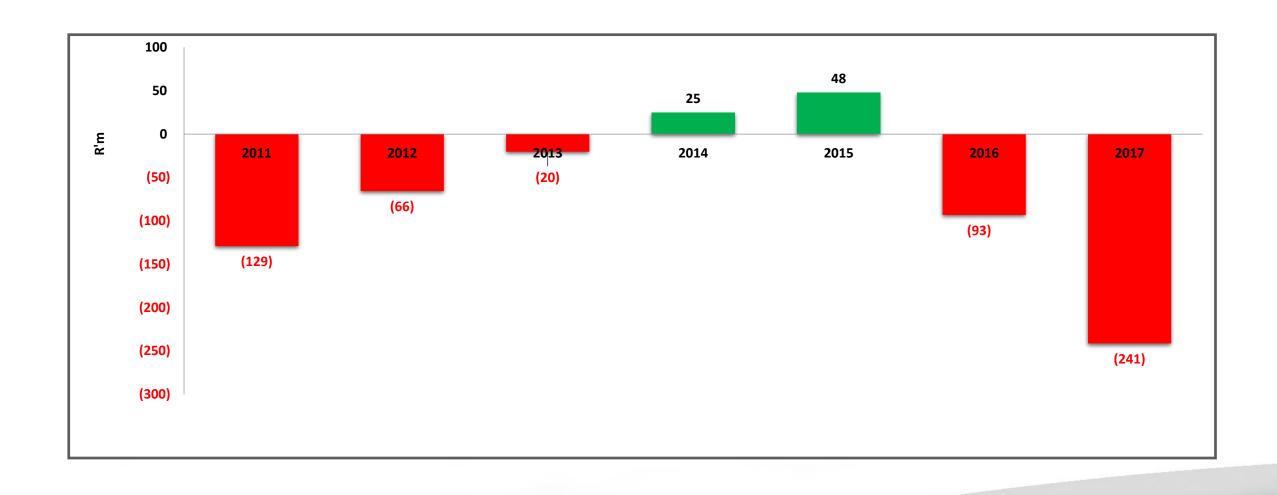


CASH SURPLUS/ SHORTAGE

Cash Surplus/(Shortage)	2017 R'm	2016 R'm	Variance R'm	Variance %
Cash and cash equivalents	97	302	(204)	(68%)
Add: Net Trade Account Receivable	258	278	(20)	(7%)
	356	580	(224)	(39%)
Less: Cash Commitments	597	673	(76)	(11%)
Employee benefit	15	17	(2)	(10%)
Deferred Grant	133	138	(5)	(4%)
Deferred Capex	51	45	6	13%
Current liabilities	398	473	(75)	(16%)
Cash surplus / (shortage)	(241)	(93)	(148)	(159%)



CASH SURPLUS/ SHORTAGE





AUDIT OUTCOME

- 1. IRREGULAR EXPENDITURE
- 2. QUALIFIED AUDIT OPINION FOR 2016/17
 - > Regression
- 3. UNQUALIFIED AUDIT OPINIONS FOR 9 YEARS

RISK AREAS IDENTIFIED BY AG

- a) Quality of submitted financial statements
- b) Financial health- from concerning 2015/16 to intervention required 2016/17



IRREGULAR EXPENDITURE

- 1. Not a result of non-compliance in supply chain process
- 2. Reasons:
 - a) Expenditure that exceeded approved budget.
 - b) Not previously identified as irregular expenditure.
 - c) Management did not seek approval as expenditure exceeded budget.
- 3. Prior year figures had to be restated as it was not raised last year



AUDIT OUTCOME

Qualified Audit

- Property, Plant and Equipment not recognized when they were available for use
- Trade debtors not recognized and measured in accordance with GRAP
- Misstatements of Financial Statements
- System Limitations -- ERP

Remedial Action items

- Audit improvement plan Detailed Plan, with specific timelines and responsibilities, was compiled and submitted to the Audit and Risk Committee and Council
- Regular reporting to Council
- Retraining of staff
- Eliminate root causes and findings by 31 December 2017



COMMENTS OR QUESTIONS

Re a Leboha! Siyabonga!

Ria Livhuwa!

Ha Khensa!

Siyathokoza!

Re a leboga

Siyabulela!

Baie Dankie!

Thank You

