AGRICULTURAL RESEARCH COUNCIL

Implementing Strategic Plan: 2015/16 – 2019/20
Through
Annual Business Plan: 2017/18

Presentation to Portfolio Committee
May 2017
ARC TEAM

Prof. Sibusiso Vil – Nkomo: Chair of Council
Dr. Shadrack R. Moephuli: CEO
Ms. Makgomo Umlaw: GE: Human Resources & Legal
Mr. Gabriel Maluleke: Chief Financial Officer
Dr. Nthabiseng Motete: GE: Crop Sciences
Dr. Jasper Rees: GE: Research & Innovation Systems
Dr. Andrew Magadlela: GE: Animal Sciences
Dr. Litha Magingxa: GE: Agric. Econ. & Capacity Building
Mr. Frans Monkwe: GE: ICT & Infrastructure
MANDATE: In terms of the Agricultural Research Act
To promote the agricultural and related sectors through:

- Research
- Development, and,
- Technology Transfer

VISION:
Excellence in agricultural research and development

MISSION:
The Agricultural Research Council is a premier science institution that conducts research with partners, develops human capital and fosters innovation to support and develop the agriculture sector
ARC ALIGNMENT TO NATIONAL PRIORITIES


Outcome 4 - Decent Employment through inclusive growth
6 Job Drivers

Outcome 7 - Comprehensive rural development and food security

Outcome 10 - Environmental assets and natural resources protected and continually enhanced

Agriculture Productive Sector Forum


Manufacturing Industrial Policy Action Plan (IPAP)
Tourism Green Economy

IGDP (Policy Framework)

Agric Policy Action Plan (APAP 5 yr iterative plan)

SIP 11
ARC CONTRIBUTION TO GOVERNMENT PRIORITIES & OUTCOMES (& SDG)

1. Contributing towards attainment of agricultural yields through improved agricultural production, productivity and biosecurity;

2. Enabling the country to respond and adapt to climate change concerns (water, land, energy, biotic and abiotic stress), including through sustainable natural resource utilization;

3. Contributing towards agricultural development, particularly smallholder farmer development;

4. Employment and Job creation across the full agricultural and agro-processing value chain; and,

5. Improved productivity, production, competitiveness and sustainability of animal and crop based agriculture;
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, wildlife and aquaculture 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. To generate and disseminate knowledge and technologies for decision making and transformation of the agriculture sector; and

6. Apply best resource management practices, towards a high performing and visible organisation.
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
ARC SCIENTIFIC IMPACT FOR AGRICULTURAL 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
1. Economic link to Innovation
2. Applied research
3. Technology Transfer/dissemination
4. Agricultural Production & productivity
5. Food & Nutrition Security
6. Environmental Sustainability
7. Import Substitution
8. Export Promotion
9. Agrarian Transformation
10. New products (vaccines, cultivars etc)
SCIENTIFIC SUCCESS THROUGH PEER REVIEWED PUBLICATIONS

Scientific Publications

<table>
<thead>
<tr>
<th>Year</th>
<th>Journal Articles</th>
<th>Conference Proceedings</th>
<th>Total Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>144</td>
<td>11</td>
<td>155</td>
</tr>
<tr>
<td>2010</td>
<td>185</td>
<td>12</td>
<td>197</td>
</tr>
<tr>
<td>2010/2011</td>
<td>199</td>
<td>13</td>
<td>212</td>
</tr>
<tr>
<td>2011/2012</td>
<td>269</td>
<td>19</td>
<td>288</td>
</tr>
<tr>
<td>2012/2013</td>
<td>211</td>
<td>20</td>
<td>231</td>
</tr>
<tr>
<td>2013/2014</td>
<td>258</td>
<td>53</td>
<td>311</td>
</tr>
<tr>
<td>2014/2015</td>
<td>353</td>
<td>48</td>
<td>401</td>
</tr>
<tr>
<td>2015/2016</td>
<td>315</td>
<td>48</td>
<td>363</td>
</tr>
<tr>
<td>*2016/2017</td>
<td>394</td>
<td>33</td>
<td>427</td>
</tr>
</tbody>
</table>

Current Estimate
Goal 1: To generate knowledge and technologies that will enhance the efficiencies in crop based agriculture

PURPOSE OF GOAL

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

OUTCOME

- Nutrient rich foods that may be biofortified (e.g. vitamin A, minerals – zinc, iron etc)
- Mitigation strategies against biotic and abiotic stresses that would improve productivity
- Sustainable production systems
- Reduction in post harvest losses
- New products and processes developed from primary agriculture
The economic value of dry bean research in South Africa
Compiled by the Agricultural Research Council’s Economic Analysis Unit for the ARC Grain Crops Institute

Impact of ARC Dry bean breeding programme

- Yield increased by 304% from 0.62t/ha in 1979 to 1.89t/ha in 2013
- 37 cultivars produced by ARC from 1980 - 2012
- ARC’s breeding increased yield by 11.65kg/ha/year from 1980-2014
- PG funding for the programme declined from 98% in 1993 to 56% in 2015
- Dry beans are an affordable, healthy source of protein for the sick and poor
- There is R5.67 in economic growth for every R1 spent on dry bean research

There is $\textbf{R5.67}$ in economic growth for every $\textbf{R1}$ spent on dry bean research

- Investment in the breeding programme has multiple benefits and a positive economic impact on SA
- Investment research and innovation yields significant impact in the long term
ARC CULTIVARS FOR SUSTAINABLE PRODUCTION & COMPETITIVENESS

No of IP registered

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No of IP registered</td>
<td>15</td>
<td>30</td>
<td>21</td>
<td>12</td>
<td>23</td>
<td>5</td>
</tr>
</tbody>
</table>

* Current Estimate
Ensuring Yield Improvements through drought tolerance and disease resistance

**Approaches for drought:**
- Use 12 of 88 highly tolerant wheat germplasm to create 66 half diallel crosses.
- Determined the combining ability and gene action controlling yield and yield related traits under drought-stressed and non-stressed conditions.

**Approaches for rust diseases:**
- Identify genes responsible for adult plant resistance to all rust diseases in a series of nested association mapping populations using both genotyping by sequencing and phenotyping methods.
- Develop germplasm with durable resistance.
Monitoring and Early Detection of Pests and Diseases

- Fall Armyworm
- *Tuta absoluta* tomato pest
- Maize Leaf Necrosis virus

Planned Activities

- Specialist diagnostic services: phytosanitary regulations & pest identification
- Biology and population dynamics of emerging pests and diseases
- Technology transfer - focus on smallholder farmer communities
- Development of pest & disease management strategies
- Expansion of community-based information platforms
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
Rift valley Fever (RVF) and Lumpy Skin Disease (LSD)

• 69% of smallholder farmers spend money on vaccines and other livestock vet costs
• For some households this is about R1500/year
• Financial losses due to RVF outbreaks in EC, NC and FS were R295m from 2008-2010
• Farmers vaccinate many animals with one needle, spreading the disease
• ARC’s OVI is developing a combined LSD/RVF vaccine for use in cattle, sheep and goats
• The vaccine will not need refrigeration and will be easy to administer by smallholder farmers

The impact of Rift Valley Fever and Lumpy Skin Disease on the South African livestock economy

Compiled by the Agricultural Research Council’s Economic Analysis Unit for the ARC Onderstepoort Veterinary Institute

Total costs of RVF control over this period were R36 million (Eastern Cape), and R17 million (Northern Cape), R10 million (Free State)
Mitigating the effects of Climate Change on Livestock Production

- ARC conducted a Retrospective analysis of the 2008–2011 RVF epidemics in South Africa
- Aim was to evaluate the combination of anomalous high rainfall and soil saturation as a combined risk indicator in a RVF forecast model for South Africa
- We were able to retrospectively identify the critical link between soil saturation, rainfall and RVF outbreaks
- The model we developed also correctly identified the risk of an outbreak in nearly 90% of instances at least one month before they occurred.
- This information is useful to farmers because it informs farmers that strategic vaccination of susceptible host populations in potential high-risk areas remains the only viable long-term solution to address RVF in South Africa
  - Also tells us that essential components of risk management strategy should include:
    - regular serologic surveys to evaluate the immune status of livestock populations
    - an effective immunization protocol backed by adequate strategic stockpiling of vaccine
    - and a reliable early warning system to identify areas where livestock could be at risk during seasons of high rainfall
- This information is now at the disposal of farmers, planners and policy makers and can be used to benefit the livestock sector.
Enabling Livestock Production and Productivity through Vaccine Development

- Vaccines are the most cost-effective of controlling livestock diseases.
- Most vaccines perform poorly especially in the African rural setting that lacks a cold chain.
- Many vaccines are difficult to produce.

- The biggest challenge of capitalising on the preventative potential of animal vaccines in Africa is maintaining an effective cold chain.

- The ARC is developing thermal-stable vaccines for foot-and-mouth disease (FMD), Petse de petits ruminants (PPR), lumpy skin disease (LSD), RVF and sheep and Goat pox to reduce the need for maintaining a cold chain during transport and administration.

- Since small stock are hardy animals that survive better than cattle during drought and other difficult conditions any intervention that would mitigate losses from these diseases would have a profound impact on small stock production and productivity.

- Our intervention targets several diseases through one dose
Enabling Livestock Production and Productivity through Genomic Research

Genetic analysis reveals that South African indigenous cattle are unique and distinct from other cattle breeds globally.

AFR – Afrikaner, BON – Bonsmara, DRA – Drakensberger, NGU – Nguni
**Goal 3: To generate knowledge and technologies for the conservation and utilisation of natural resources**

**FOCUS OF GOAL**

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

**OUTCOMES WITH ASSOCIATED IMPACT**

1. Climate smart agriculture technologies adopted & utilized that sustainably increase agricultural productivity and incomes;
2. 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
The value of investing in biocontrol research

- Invasive alien species (IAPs) use up to 3.3b m\(^3\) of water every year in SA and can result in loss of local biodiversity
- Mechanical control through felling, clearing or burning creates employment, but is at least 10 times more expensive than bio control
- ARC’s bio-control measures resulted in \textit{R1.38b saved in managing invasive alien species} in SA
- ARC researchers have tested over 270 agents for bio control, \textit{106 of which were approved for release}
- Increased investment in bio-control research will reduce the spread and negative effects of Invasive alien species in SA

Over 10 million hectares of South African land has been invaded and affected by invasive alien plants. This is 12.2% of South Africa’s total land area.
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.
- Agro-processing, 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.
Analysis of Meat for Food Safety to Support Regulatory Decisions

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Port of entry</th>
<th>#samples tested</th>
<th>#positive samples</th>
<th>Meat type for positive L. monocytogenes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Durban</td>
<td>2</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Australia</td>
<td>Durban</td>
<td>16</td>
<td>1</td>
<td>Beef Liver</td>
</tr>
<tr>
<td>Belgium</td>
<td>Durban</td>
<td>1</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Brazil</td>
<td>Durban</td>
<td>27</td>
<td>1</td>
<td>Chicken Feet</td>
</tr>
<tr>
<td>Canada</td>
<td>Durban</td>
<td>4</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Denmark</td>
<td>Durban</td>
<td>2</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Germany</td>
<td>Durban</td>
<td>3</td>
<td>1</td>
<td>Beef Hearts</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Durban</td>
<td>13</td>
<td>2</td>
<td>Poultry Backs (n=1); chickenDrummets (n=1)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Durban</td>
<td>3</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Spain</td>
<td>Durban</td>
<td>13</td>
<td>3</td>
<td>ChickDrumsticks (n=1); legquarter (n=1); Chicken Wings (n=1)</td>
</tr>
<tr>
<td>Ireland</td>
<td>Durban</td>
<td>1</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>UK</td>
<td>Durban</td>
<td>17</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Durban</td>
<td>7</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>USA</td>
<td>Durban</td>
<td>2</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Unspecified origin</td>
<td>Durban</td>
<td>21</td>
<td>1</td>
<td>lamb</td>
</tr>
<tr>
<td><strong>Total for Durban</strong></td>
<td></td>
<td><strong>132</strong></td>
<td><strong>9</strong></td>
<td></td>
</tr>
</tbody>
</table>

The ARC plays an important role in ensuring that meat imported into South Africa is safe and consumers are protected from possible risk of foodborne infections.

This is done through analysis of meat samples from diverse animal species for zoonotic foodborne pathogens such as *Salmonella* spp, *Listeria monocytogenes*, and Shiga toxin *Escherichia coli*.

Last year we analysed meat from all three major ports of entry into the country; Durban, Cape Town and Port Elizabeth (eg DurbanTable).

Our work in this area is key to keeping consumers safe from food borne pathogens.
Goal 5: To generate and disseminate knowledge and technologies for decision making and transformation of 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
Training Smallholder Farmers

- More than 5000 farmers trained in various provinces on production and management.
- 22 technologies (cultivars and patents) made available to the agricultural sector in the year under review.
- These include: an early litchi cultivar; three onion lines; six Lachenalia cultivars; three ruminant feed technologies; three clones with potential usage as laboratory reagents in biotechnology as well as an inoculant against crown gall.
- Infrastructure such as cattle handling and auction facilities revitalised resulting in significantly more animals auctioned and income received.
- The ARC and Masisizane Fund concluded a Service Level Agreement for supporting and mentoring of farm workers; expert advice; soil analysis and farm mapping for cooperatives in the uMzimkhulu area.
STRATEGIC GOAL 6

Apply best resource management practices, towards a high performing and visible organisation
A high proportion of experienced researchers are approaching retirement.

The national education system is not providing a strong enough pool of SET manpower to meet current and future ARC demands.

Higher–end specialist skills to ensure future growth of ARC therefore cannot be provided by conventional educational streams.

These skills are in global demand, need long-term development and require resources, including funding, equipment, study materials and infrastructure.

The need for a higher ratio of scientists to total staff, particularly at post graduate level.

The urgent need to improve ratios of women, black and young researchers.

The need to improve the qualifications profile of ARC and to expand its Science Engineering and Technology base.

The need to train and deploy young graduates into ARC researcher positions.
HUMAN RESOURCES DEVELOPMENT AT ARC

STUDENTS = 297
POSTGRADUATE

PERMANENT EMPLOYEES = 192
POSTGRADUATE
Information & Communications Technologies

- Investigating adoption and use of cloud services, among other technology innovations, with appropriate justification, as an opportunity for reducing cost of ownership of technology platforms;
- Investigating and assessing applicability of innovations such as the “internet of things” (IoT), mobility, big data - planning for a pilot IoT in progress;
- Defining and developing an “ARC big data” framework/strategy as a contributor to knowledge management (KM);
- Exploring and developing solutions for meaningful, interactive farmer/stakeholder engagements, namely, mobile applications for information capture and/or dissemination;
- Continuing with enablement of platforms for enhanced stakeholder engagement, namely dedicated, continuous process improvements across various business process domains

Infrastructure, Security

- Against a background of constrained and declining funding, initiatives in Infrastructure include the following:
  - commercial production – this supports optimum utilization of our land properties and has potential to supplement other income sources;
  - increased rental income from facilities/infrastructure that can in turn fund critical maintenance of our facilities and infrastructure critical to research and development;
  - is there an appetite/willingness for engage the consolidation topic meaningfully?
- Review of current approved asset management plan, as well as executing approved business cases for disposal of certain assets – this will eventually have a cost reduction impact on the ARC
- Cost-saving initiatives relating to energy consumption, water, etc
FINANCIAL PERFORMANCE
Background to ARC Financial Management
Budget Assumptions

a) 19.3% increase in Parliamentary grant (from an eroded base already)
b) External Income growing at a diminishing rate
c) Salary increases
   - 2017/18 - 5.5%
   - 2018/19 – 6.5%
   - 2019/20 – 6.5%
d) Operating expenses growing at inflation
e) Reduction in projects Department of Rural Development projects
f) No funding for Economic Competitiveness Support Packages
g) No funding for the FMD (Food and Mouth Disease) facility
## ARC Financial Position (MTEF) 2016/17 – 2019/20

<table>
<thead>
<tr>
<th>Financial Performance</th>
<th>2016/17 Forecast R’m</th>
<th>Var. %</th>
<th>2017/18 Budget R’m</th>
<th>Var. %</th>
<th>2018/19 Budget R’m</th>
<th>Var. %</th>
<th>2019/20 Budget R’m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parliamentary Grant</td>
<td>760</td>
<td>16.1%</td>
<td>883</td>
<td>5.8%</td>
<td>933</td>
<td>5.6%</td>
<td>986</td>
</tr>
<tr>
<td>PG - Operational</td>
<td>673</td>
<td>17.6%</td>
<td>791</td>
<td>5.8%</td>
<td>837</td>
<td>5.6%</td>
<td>884</td>
</tr>
<tr>
<td>PG - Capex</td>
<td>87</td>
<td>5.0%</td>
<td>91</td>
<td>5.8%</td>
<td>97</td>
<td>5.6%</td>
<td>102</td>
</tr>
<tr>
<td>External Income</td>
<td>370</td>
<td>9.1%</td>
<td>404</td>
<td>8.0%</td>
<td>436</td>
<td>6.0%</td>
<td>462</td>
</tr>
<tr>
<td>Other Income</td>
<td>26</td>
<td>10.0%</td>
<td>28</td>
<td>2.0%</td>
<td>29</td>
<td>6.0%</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td><strong>1,156</strong></td>
<td><strong>13.7%</strong></td>
<td><strong>1,315</strong></td>
<td><strong>6.4%</strong></td>
<td><strong>1,398</strong></td>
<td><strong>5.7%</strong></td>
<td><strong>1,478</strong></td>
</tr>
<tr>
<td>Expenses</td>
<td><strong>1,288</strong></td>
<td><strong>-6.3%</strong></td>
<td><strong>1,369</strong></td>
<td><strong>-6.2%</strong></td>
<td><strong>1,453</strong></td>
<td><strong>-6.2%</strong></td>
<td><strong>1,543</strong></td>
</tr>
<tr>
<td>Personnel Costs</td>
<td>774</td>
<td><strong>-6.8%</strong></td>
<td>826</td>
<td><strong>-6.5%</strong></td>
<td>880</td>
<td><strong>-6.5%</strong></td>
<td>937</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>471</td>
<td><strong>-5.9%</strong></td>
<td>498</td>
<td><strong>-6.0%</strong></td>
<td>528</td>
<td><strong>-6.0%</strong></td>
<td>560</td>
</tr>
<tr>
<td>Depreciation</td>
<td>44</td>
<td><strong>-2.0%</strong></td>
<td>45</td>
<td><strong>-2.0%</strong></td>
<td>46</td>
<td><strong>-2.0%</strong></td>
<td>46</td>
</tr>
<tr>
<td><strong>Surplus/(Deficit) for the year</strong></td>
<td><strong>-132</strong></td>
<td><strong>41.2%</strong></td>
<td><strong>-54</strong></td>
<td><strong>-1.2%</strong></td>
<td><strong>-55</strong></td>
<td><strong>-17.8%</strong></td>
<td><strong>-65</strong></td>
</tr>
</tbody>
</table>
### Balance Sheet

<table>
<thead>
<tr>
<th></th>
<th>2016/17 Forecast R’m</th>
<th>Var. %</th>
<th>2017/18 Budget R’m</th>
<th>Var. %</th>
<th>2018/19 Budget R’m</th>
<th>Var. %</th>
<th>2019/20 Budget R’m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property, Plant and Equipment</td>
<td>1,104</td>
<td>4.2%</td>
<td>1,151</td>
<td>4.4%</td>
<td>1,201</td>
<td>4.6%</td>
<td>1,256</td>
</tr>
<tr>
<td>Investments</td>
<td>4</td>
<td>0.0%</td>
<td>4</td>
<td>0.0%</td>
<td>4</td>
<td>5.6%</td>
<td>5</td>
</tr>
<tr>
<td>Current Assets (Excluding Cash)</td>
<td>193</td>
<td>-0.2%</td>
<td>192</td>
<td>-6.2%</td>
<td>180</td>
<td>-1.8%</td>
<td>177</td>
</tr>
<tr>
<td>Cash Resources</td>
<td>109</td>
<td>-91.4%</td>
<td>9</td>
<td>-1133.7%</td>
<td>-97</td>
<td>125.2%</td>
<td>-218</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>1,411</td>
<td>-3.8%</td>
<td>1,357</td>
<td>-5.0%</td>
<td>1,289</td>
<td>-5.4%</td>
<td>1,220</td>
</tr>
<tr>
<td>Capital and Reserves</td>
<td>853</td>
<td>-6.4%</td>
<td>799</td>
<td>-6.9%</td>
<td>744</td>
<td>-8.7%</td>
<td>679</td>
</tr>
<tr>
<td>Non-Current Liabilities</td>
<td>193</td>
<td>0.0%</td>
<td>193</td>
<td>0.0%</td>
<td>193</td>
<td>0.0%</td>
<td>193</td>
</tr>
<tr>
<td>Current liabilities</td>
<td>365</td>
<td>0.2%</td>
<td>365</td>
<td>3.3%</td>
<td>353</td>
<td>1.2%</td>
<td>349</td>
</tr>
<tr>
<td><strong>Total Equity and liabilities</strong></td>
<td>1,411</td>
<td>3.8%</td>
<td>1,357</td>
<td>5.0%</td>
<td>1,289</td>
<td>5.4%</td>
<td>1,220</td>
</tr>
</tbody>
</table>

### Cash Flow

<table>
<thead>
<tr>
<th></th>
<th>2016/17 Forecast R’m</th>
<th>Var. %</th>
<th>2017/18 Budget R’m</th>
<th>Var. %</th>
<th>2018/19 Budget R’m</th>
<th>Var. %</th>
<th>2019/20 Budget R’m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cash Flow From Operating Activities</td>
<td>-95</td>
<td>-89.7%</td>
<td>-10</td>
<td>-2.6%</td>
<td>-10</td>
<td>93.1%</td>
<td>-18</td>
</tr>
<tr>
<td>Net Cash Flow From Investing Activities</td>
<td>-97</td>
<td>-7.2%</td>
<td>-90</td>
<td>6.2%</td>
<td>-96</td>
<td>7.7%</td>
<td>-103</td>
</tr>
<tr>
<td>Cash And Cash Equivalents at Beginning Of Year</td>
<td>301</td>
<td>-63.8%</td>
<td>109</td>
<td>-91.8%</td>
<td>9</td>
<td>-1179.8%</td>
<td>-97</td>
</tr>
<tr>
<td>Cash And Cash Equivalents at End Of Year</td>
<td>109</td>
<td>-91.8%</td>
<td>9</td>
<td>-1179.8%</td>
<td>-97</td>
<td>126.1%</td>
<td>-218</td>
</tr>
</tbody>
</table>
Operational Expenditure vs Operational PG (2009/10 – 2019/20)
Implications of Budget Cuts

a) Income statements – Deficits over the MTEF
b) Return to negative cash position over MTEF
c) Student intake will be limited - capacity building
d) Possible Retrenchments
e) Vaccine development projects negatively affected
f) Review ARC pricing of Diagnostic and Analytical Services
g) Require full prepayments from Government Departments
h) Possible closure of some research facilities
i) KyD (Kaonafatso ya Dikgomo) activities to be curtailed
j) Animal Vaccine Development to be curtailed
Comments or Questions

Re a Leboha!
Siyabonga!
Ria Livhuwa!
Ha Khensa!
Siyathokoza!
Re a leboga
Siyabulela!
Baie Dankie!
Thank You