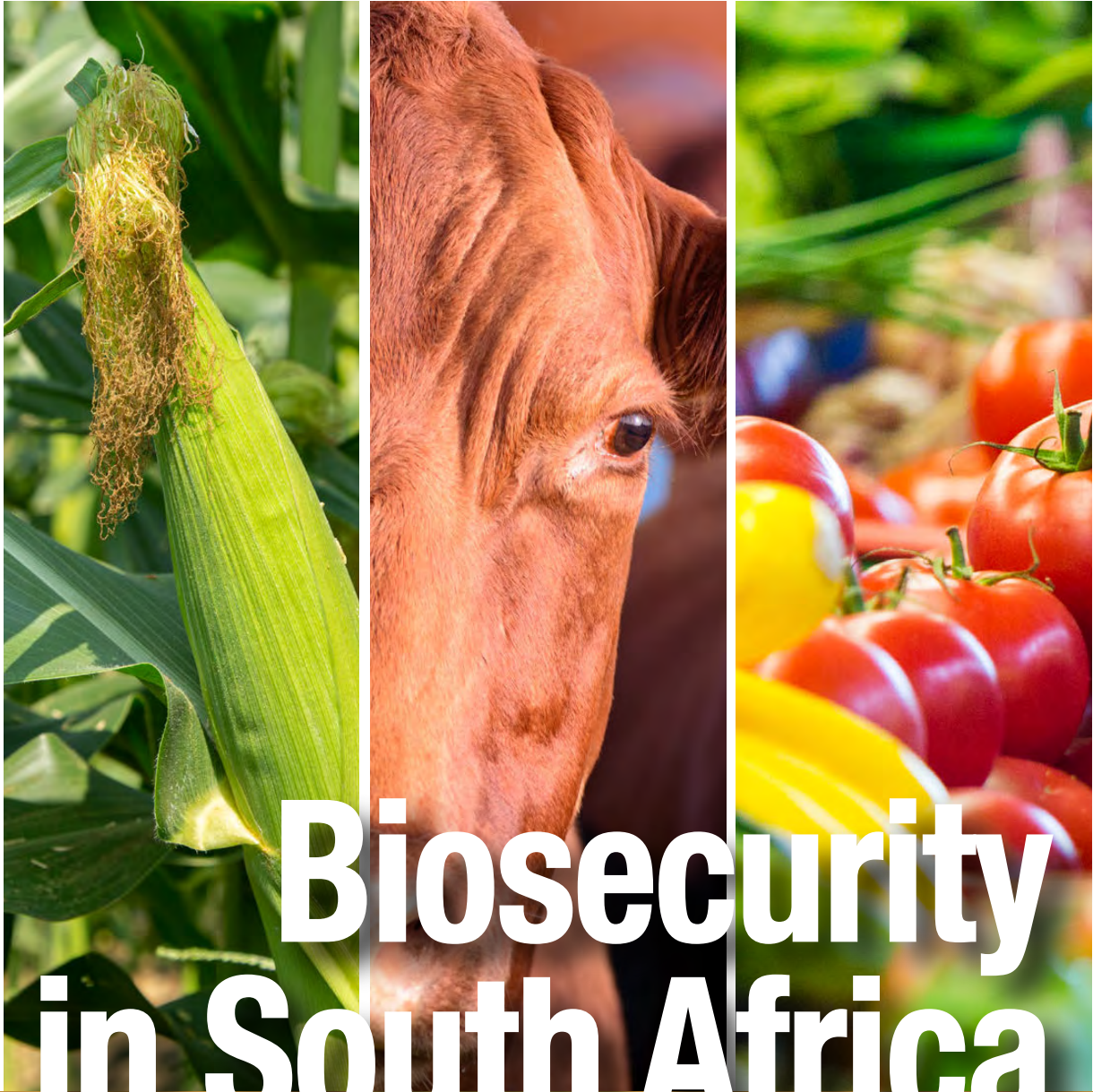


October 2022

NATIONAL BIOSECURITY HUB



Biosecurity in South Africa a renewed focus

Plant Health

Animal Health

Food Safety



Agriculture, Land Reform and Rural Development
Science and Innovation



CONTENTS

Foreword	02
National Biosecurity Hub Why, What & How?	04
Agricultural Context Capacity through Collaboration <i>Video: National Biosecurity Hub</i> Strategic Focus Areas	
Plant Health The Need for Research and Capacity Development	06
Pests Diseases Weeds and Alien Invasive Species Impact of Partner Platforms <i>Video: ARC - National Public Goods Assets</i>	
Animal Health Joint Approach to Curb Disease Outbreaks	11
Outbreaks <i>Video: Impact of Foot-and-Mouth Disease</i> Faculty of Veterinary Science University of Pretoria ARC-Onderstepoort Veterinary Research Campus	
Food Safety Link to Human Health	16
Causes of Foodborne Diseases Centre for Food Safety <i>Video: Food Safety</i>	
ABIPP Key Instrument of the Agricultural Bio-Economy	18
Goal and Objectives ABIPP and Biosecurity	
Innovation Africa @UP Research and Investment Platform	21
Vision, Objectives and Core Drivers	

Biosecurity has a significant impact on food security, food safety and ultimately, the economy.

It affects every citizen of the country; be it direct or indirect.

Hence the need for **The National Biosecurity Hub** - a multi-stakeholder partnership initiative geared to address a multitude of current and potential future threats to biosecurity in South Africa.



FOREWORD



Ms. Thoko Didiza

Minister of Agriculture, Land Reform
and Rural Development of South Africa



Dr. Blade Nzimande

Minister of Science and Innovation of
South Africa

The launch of a joint national biosecurity hub by the Department of Science and Innovation (DSI) and Department Agriculture, Land Reform and Rural Development (DALRRD) heralds a significant development and advancement for the national system of innovation. The national biosecurity hub is underpinned by a robust science-based regulatory and national response system, international norms and standards on risk assessments and risk management and effective coordination of all role players (government, industry and research community).

Effective plant and animal health and food safety regulatory systems are vital for the country to ensure compliance with international obligations and responsibilities in terms of free, safe, fair and sustainable trade and the expansion and sustainability of the agricultural sector. The intricacies of our regulatory framework extend to assessment of risks for existing and emerging pests and diseases, the institution of appropriate actions to achieve an appropriate level of protection, emergency responses in terms of containment, management, ongoing surveillance of existing threats and reporting, etc. However, effective biosecurity systems also require the added impetus of dedicated research capacity as well as research and information services (detection, diagnosis, monitoring, surveillance) to clients in the public and private sectors, supporting not only access to the most up to date methods but appropriate validated delivery methods for farmers to meet the sanitary and phytosanitary (SPS) requirements of domestic and international trade. The Biosecurity Hub will do just that – It provides government with a platform to coordinate the efforts of all stakeholder, public and private, facilitate engagements on phytosanitary matters to enable quicker responses (and solutions) and ensure that appropriate measures are implemented on a timely basis.

This launch is possible not because we now know what must be done in biosecurity, it's possible because the seeds we planted yesterday enable us to reap great reward today (*#itspossible*). This launch is the culmination of years of hard work by individuals in this space, viz. the existing regulatory systems, the trade and diplomatic relations developed and the scientists that have worked tirelessly to build the knowledge base that allow us to collectively build an integrated system, the Biosecurity Hub, that leads us into the future.

There are a number of key national strategies that govern biosecurity and the Science Technology and Innovation (STI) in agriculture. The Agriculture and Agro-processing Masterplan (AAMP) is a key strategy of the DALRRD, it is a social compact intended to rethink and re-imagine agricultural intensification, increased productivity and competitiveness in support of economic recovery

through enhanced initiatives of the agricultural sector in enabling food security and rural transformation through partnerships. The new Decadal plan of the DSI further prioritises the revitalisation of traditional sectors of the economy such as Agriculture, supporting the theory of change for “innovation driving revitalisation of agriculture” and positioning research, development and innovation (RDI) as a driver of such growth. Through its key instrument, the Agricultural Bio-economy Innovation Partnership Programme (ABIPP), the DSI supports the development of technologies and innovative solutions for inclusive development, including high-end capabilities of research institutions and innovation partnerships between government and industry to help achieve the goals of the sector. The ABIPP supports biosecurity research that is now elevated to a hub with all role-players being brought on board.


There is a need for a systematic approach on how the various technologies that are evolving at a rapid rate, become part of the toolkits available to researchers, technicians and decision-makers, such that there are consistent databases providing

the right advice at the right time. The Biosecurity Hub will provide an integrated decision support system between the regulator, key public-private partnership programmes and the Information Hub at Innovation Africa @University of Pretoria (IA@UP). The Information Hub will collect and store biosecurity data to ensure the validity and accessibility of the data. IA@UP, therefore plays a key role in partnering not only with institutions at University of Pretoria but all other universities and public-private institutions in South Africa, to grow the information hub component of the Biosecurity Hub which is already showing significant promise and contributing to development of digital decision support systems. The hub will therefore also be an important communication tool for all stakeholder and contribute to the preparedness and the agility of the country to any crisis that arises.



Ms T Didiza, MP

Minister of Agriculture, Land Reform and Rural Development



Dr BE Nzimande, MP

Minister of Science and Innovation

Signed on 11 October 2022



Agriculture, Land Reform and Rural Development
Science and Innovation

NATIONAL BIOSECURITY HUB

WHY, WHAT & HOW?

AGRICULTURAL CONTEXT

The agricultural industry is a crucial lifeline in terms of food security, whilst significantly contributing to the national economy; both as primary industry and catalyst to a long economic value chain. Yet, this pivotal industry is faced by a number of challenges; the increasing outbreaks of pests and diseases being one of the main challenges.

Therefore, a renewed focus on biosecurity is of utmost importance, as it impacts crop production, animal production, food safety and trade.

Biosecurity refers to methods, technologies, and strategies that are used to safeguard agricultural spaces, animals, and plants from infectious diseases and invasive species. With food production being the primary purpose of agriculture, it also includes food safety monitoring.

The National Bio-Economy Strategy (2013) envisions and calls for a vibrant and economically sustainable agricultural sector through bio-innovative technologies, products, processes and services; contributing to increased productivity, food security, rural economic development and the economy as a whole.

CAPACITY THROUGH COLLABORATION

As part of the Job Summit Commitment (2018), the South African government and business sector have agreed to identify key areas where capacity constraints have hampered the effective execution of statutory duties and services related to business processes and trade.



Biosecurity has been identified as one of the areas where government and industry can collaborate in support of sustainable production and safe trade.

In South Africa, it is vital for government and industry to jointly work toward ensuring that biosecurity threats are identified and dealt with timeously and appropriately, by means of clear role definition, shared expertise and co-funding.

Through the establishment of the National Biosecurity Hub, technical experts from industry and research institutions can cooperate with the government on biosecurity issues. As a result, threats can be anticipated and dealt with efficiently, while building national sanitary and phytosanitary (SPS) capacities. It, therefore addresses certain targets set by the Job Summit Commitment, in terms of easing capacity constraints.

The World Trade Organisation's Agreement on Sanitary and Phytosanitary measures (WTO-SPS Agreement) recognises three international standard-setting bodies for the main focus areas of biosecurity:

- Plant Health: International Plant Protection Convention (IPPC)
- Animal Health: World Organisation for Animal Health (WOAH)
- Food Safety: Codex Alimentarius

Using the approaches recommended by the international standard bodies in the development of national SPS systems, the Biosecurity Hub sets out to strengthen national biosecurity, build technical and information management services and meet the SPS requirements of international trade.

CENTRALISED PLATFORM

The National Biosecurity Hub is coordinated by Innovation Africa @University of Pretoria ([IA@UP](#)) to link stakeholders within the industry, the broader research community and government ([DALRRD](#) and [DSI](#)). The aim of the hub is to coordinate participation of representatives throughout the agricultural chain, to assist with solutions and policy direction pertaining to plant health, animal health and food safety.



* Please click on the image above to view the video.

The specific objectives of the Biosecurity Hub are to:

- **Promote engagements on SPS matters** through establishing appropriate communication structures.
- **Develop a Biosecurity Information Hub** to store and manage SPS and related information.
- **Create opportunities** for human capital development.
- Work with public and private stakeholders to **prevent, respond to and manage pests and diseases** that threaten the environment, human health, animal health and/or the economy.
- Work with public and private stakeholders to **conduct research on known and emerging biosecurity threats**.

STRATEGIC FOCUS AREAS – IN PARTNERSHIP WITH GOVERNMENT, INDUSTRY AND RESEARCH INSTITUTIONS

Operations

These include risk analyses, surveillance, emergency response, inspections, diagnostic services and quarantine services.

Research

Specific and dedicated research on current and potential threats to plant health, animal health and food safety.

SPS Policy Development

Provision of technical support for SPS policy development and review.

SPS Capacity Development

Provision of expertise and technical assistance to develop SPS capacities for the public and private sectors.

SPS Training

Development of training opportunities in SPS that are appropriate to the needs of the country; including the establishment of formal training curricula and information materials for use as demonstration and training tools.

SPS Awareness

Sharing awareness of key issues through various media platforms and workshops.

Biosecurity Information Hub

A central repository for storing of data (access will be restricted as needed). Downstream applications will include information on national regulated pest lists and pest data sheets, as well as commodity pest lists and surveillance, whilst enabling quick access to methodologies, guidelines and forms.



Plant Health

NEED FOR RESEARCH & CAPACITY DEVELOPMENT

Biosecurity has a major impact on plant production, and the need for intensified research and control measures, is now more critical than ever.

Increased pests and diseases ultimately impact every citizen, but farmers are directly affected through:

- reduction in quantity of marketable yield;
- reduction in quality (e.g. downgrading of marketed product);
- extra costs of pest control;
- extra costs of harvesting and grading;
- costs of replanting; and
- Loss due to the necessity of growing alternatives (possibly lower-yielding crops).

“ Challenges that we are experiencing, revolve around the emergence of new pests and diseases as a result of climate change, as well as the increased movement of people and goods. This has led to South Africa, like many other countries, being exposed to more pests and diseases.”

Dr Julian Jaftha

Chief Director for Plant Production and Health
Department of Agriculture, Land Reform and Rural
Development (DALRRD)

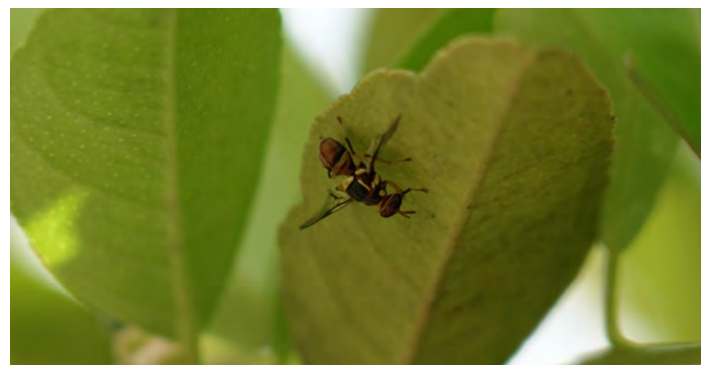
An effective local plant health regulatory system, in compliance with international plant health regulations, is vital to the sustainability of our agricultural and forestry sectors, as well as safe and maintainable trade.

REGULATED PESTS

The International Plant Protection Convention (IPPC) of which South Africa is a party to, stipulates two categories of plant pests that are directly subject to official regulation:

Quarantine Pest

A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (IPPC, 1997).



Oriental Fruit Fly (*Bactrocera dorsalis*) originated in Sri Lanka and is now invading Africa, causing severe damage to fruit and vegetable crops.

Oriental Fruit Fly (OFF) is a pest of economic importance belonging to the Tephritidae family. Since detected in Mozambique in 2003, OFF distribution in Africa has been reported in eastern and western countries along the equator and as far north as Mali. It has recently also been detected as far south as Namibia and Mozambique.

Regulated Non-Quarantine Pest (RNQP)

A pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (IPPC, 1997).



Fall Armyworm (*Spodoptera frugiperda*) is native to South and North America, but a quarantine pest in Africa, causing significant damage to maize crops in particular. When it first arrived in South Africa in 2017, it was identified by the Agricultural Research Council ([ARC](#)) through the South African National Collection of Insects ([SANC](#)).

PEST PATHWAYS

Invasive pathways of pests depend on the particular pest. According to Dr Roger Price, Research Team Manager of Insect Ecology at ARC Plant Health and Protection, fall armyworm “came down on the winds and billions of moths flew over our borders in 2017”. *Tuta absoluta*, commonly known as the invasive tomato leaf miner, spreads similarly.

In turn, locust outbreaks are driven by rainfall cycles. They react to long drought periods and then sudden drought-breaking rains. “So when you get a drought in the Karoo followed by widespread rains, you get locusts.”



Brown Locust (*Locustana pardalina*).

South Africa has been experiencing a brown locust outbreak since September 2021, with the largest number of confirmed sightings in decades.

The brown locust is a grass feeder. It feeds on the grasses in the Karoo area and crops related to grasses, such as maize, wheat, sorghum and rice.



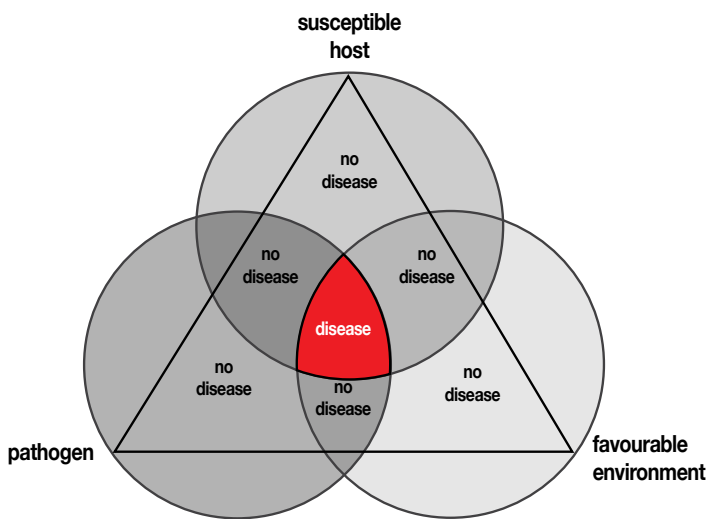
Brown Locust pathway diagram from [ARC - Plant Health and Protection](#)



Brown Locust collection at [ARC - Plant Health and Protection](#)

DISEASES

To spread, pests and diseases require susceptible hosts. As a result, the plant diseases that are most alarming are those that threaten large companies producing staple foods and export produce. Once a disease that affects a particular crop starts spreading, it becomes hard to control. It also directly affects food security and trade. As a result, emerging diseases that threaten maize production in other parts of Africa, are continuously monitored.



Disease triangle

Pathogens can remain in a field for many years without causing infection, if environmental conditions are not favourable. A disease which occurs in a specific area within a particular season; may be absent in the same area the following season if the conditions are not favourable.

Maize is susceptible to many different diseases. Fungi, bacteria and viruses can affect different parts of the plant, including the roots, stems, leaves and cobs.

Once disease is present in a single plant, it can be spread to surrounding plants by wind blowing bacterial spores, which settle on leaves and stems and start to take destructive action in the next plant.

Diseases that attack maize plants, include:

- Grey leaf spot
- Leaf spot
- Ear rot and stalk rot



Banana Bunchy Top Virus (BBTV) is the most serious virus to attack bananas and plantains. BBTV has been confirmed in Africa, Asia, Australia and South Pacific Islands. It was detected in the Ugu District of KwaZulu-Natal's South Coast region.

According to Dr Julian Jaftha, Chief Director for Plant Production and Health at DALRRD, surveillance and sample collection for identification is ongoing, with a total of 21 monthly site visits in the South Coast district of the KwaZulu-Natal province.

Because all banana cultivars are susceptible to BBTV, the disease is a major constraint to production in areas where it occurs. In Sub-Saharan Africa, BBTV has caused reductions of between 70% and 90%. The presence of BBTV can also lead to restrictions on import and export markets.

BBTV is transmitted by an aphid vector (*Pentalonia nigronervosa*) and is disseminated in vegetative planting material, but is not transmitted by mechanical inoculation. The virus is also spread through infected planting material.

WEEDS AND ALIEN INVASIVE SPECIES



Pompom Weed (*Eupatorium macrocephalum*)

Weeds and alien invasive species must be actively controlled since they compete for resources, such as water and space, with cultivated crops.

According to Dr Ansa van Vuuren, Senior Manager at ARC Plant Health and Protection, South Africa has more than 300 officially listed alien invasive plant species. “In dryland areas, between 1.4 and 2.4 billion cubic meters of water are lost yearly through these alien invasive plant species. These species also impact on animal production and wildlife, by invading grazing land.”

IMPACT OF PARTNER PLATFORMS

The National Biosecurity Hub was born out of the work done by the Plant Health Consortium. The hub provides a platform for all stakeholders in the agricultural value chain to engage and ensure that the needs of various stakeholders are acknowledged.

The Plant Health Consortium was established in 2016 to:

- **improve** the management of economically important pests, diseases and weeds

and respond to the threats presented by quarantine pests and pathogens;

- **investigate** pest and pathogen biology;
- **implement** disease detection, diagnosis and surveillance; and
- **support** farmers with technology and digital agriculture.

Since its inception, the consortium has undertaken various projects, which include identification, surveillance and control of problematic pests. These include fall armyworm and soil-borne diseases like *Sclerotinia sclerotiorum*, a fungus causing major losses in sunflower, soya beans and canola.

Plant Health Consortium Partners:

Department of Science and Innovation, Department of Agriculture, Land Reform and Rural Development, Grain South Africa, Agricultural Research Council, North West University, University of the Western Cape, University of Pretoria, University of the Free State, Cropwatch Africa, Forestry South Africa, Agbiz, South African Macadamia Association, Subtropical Industries, Ukhanyo Farmer Development and input suppliers.

[Grain SA](#) has been a partner from the onset. This inclusive grain producers’ organisation represents farmers of maize, wheat, soya, sunflower, sorghum, canola, barley and oats. With members across the scale spectrum - from subsistence to commercial – they are an important link to biosecurity. The organisation is also known for their high-level expertise in terms of plant science, agricultural economics and communication.

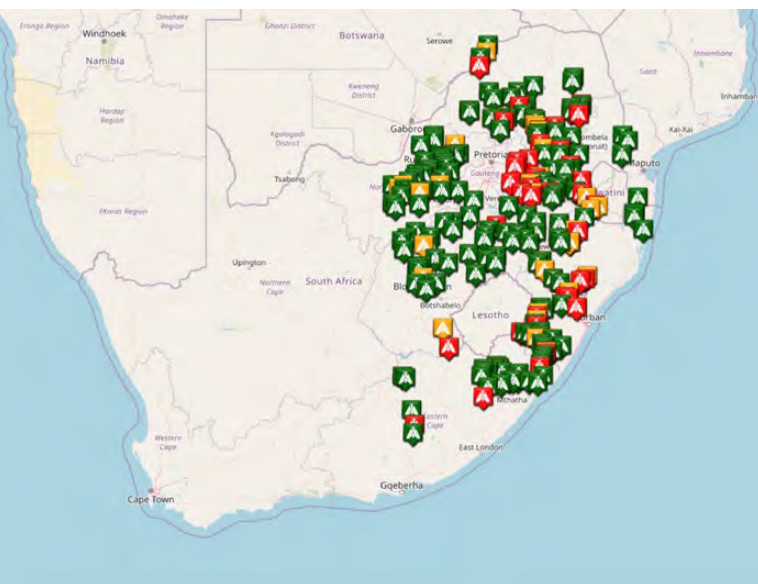


[Ukhanyo Farmer Development Programme](#)

[Cropwatch Africa](#) is an independent service provider focussed on effectively monitoring pest and disease levels through advanced technology solutions.



[Cropwatch](#) - Precision Agriculture Platform for Farmers.



[Cropwatch](#) - Biosecurity Platform for Government and Industry (Surveillance).

NATIONAL PUBLIC GOODS ASSETS

The identification of species and outbreak patterns often lies in links to history. As a public entity, the [ARC](#) is the custodian of [National Public Goods Assets](#) pertaining to agricultural research. Such assets and services are defined as being of benefit to all members of society.



* Please click on the image above to view the video.

ARC INVENTORY OF NATIONAL PUBLIC GOODS ASSETS

Living Collections:

All living animal and plant collections utilised for research and breeding purposes (livestock, cultivars, insects).

Databases:

Organised collection of structured information, or data, typically stored electronically in a computer system and used for research and information (climate data, soil & vegetation maps and images).

Facilities:

Infrastructure linked with scientific expertise and services (reference laboratories, vaccine production facility, computing and quarantine / biosafety facilities).

Biobanks:

For scientific purposes, the Biobanks accept, process, store, and distribute biospecimens and associated data (gene banks, germplasm, biodiversity).

Natural Science Collections:

Preserved reference collections of biological material used to archive biodiversity for research purposes (insects, parasites, spiders, mites, nematodes and fungi).



Animal Health

JOINT APPROACH TO CURB DISEASE OUTBREAKS

The livestock and poultry sectors are vital to South Africa. As main protein sources, these industries have a huge economic impact throughout the value chain.

In deep rural areas, livestock farming is often the primary source of income, which amplifies the impact of animal disease outbreaks.

OUTBREAKS

The outbreaks of foot-and-mouth disease and avian influenza have seen concerted efforts from government, research institutions and farmer organisations to stop the spread.

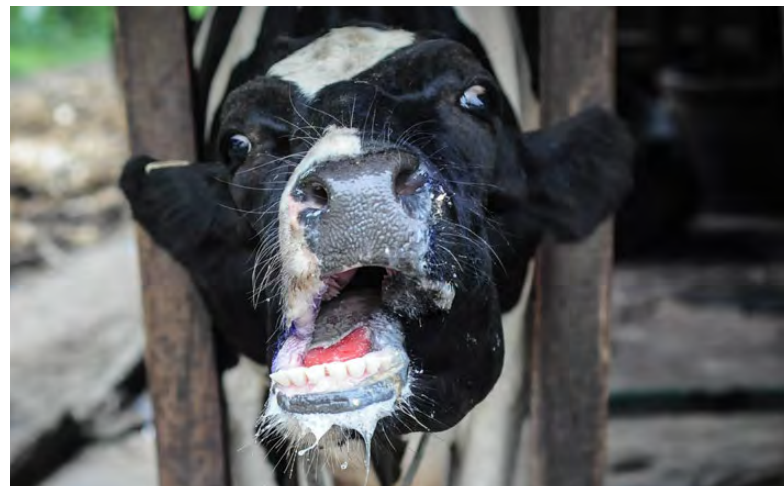
African swine fever is now also under the radar. And, although rabies is rarely transferred to livestock, it carries an almost 100% mortality rate in infected species (including humans), making recent outbreaks of the disease, highly concerning.

“ Within the sphere of animal health, we have been experiencing a number of animal disease outbreaks. Foot-and-mouth disease in particular.”

Dr Michael Modisane

Chief Director for Animal Production and Health
Department of Agriculture, Land Reform and Rural Development (DALRRD)

Foot-and-mouth Disease (FMD)





* Please click on the image above to view the video.

The foot-and-mouth virus infects cloven-hoofed livestock and is highly contagious. Although not many animals die from the disease, it has a major impact on production and trade.

According to Dr Michael Modisane, Chief Director for Animal Production and Health at [DALRRD](#), the SAT2 virus is circulating in KwaZulu-Natal and SAT3 in the other five provinces (Limpopo, Mpumalanga, Gauteng, North West and Free State).

Government is also closely monitoring an outbreak of a foreign strain in African countries.



Buffaloes are carriers of FMD, but have over the years adapted to the disease

To help protect livestock, there is an official vaccination programme for cloven-hoofed animals around the Kruger National Park. This has contributed to assisting control of FMD in Limpopo during the recent outbreak.

To better understand buffalo resistance to FMD, surveillance research was undertaken by the Faculty of Veterinary Science ([FVS](#)) at the University of Pretoria. This was the first FMD surveillance research in an endemic part of the country.

The FVS laboratory at the Orpen Gate of the Kruger National Park, is currently doing research on buffalo FMD and evaluating a new molecular device to allow carcass screening for FMD virus.

Avian Influenza

Avian influenza is a disease primarily of birds and therefore of concern to the poultry and ostrich industries. It is a zoonotic infection and can therefore spill over to mammals, including humans.

There are two main forms of the disease: low pathogenic avian influenza and highly pathogenic avian influenza. The low pathogenic form is found in wild ducks and other types of wild waterbirds. Those birds mostly don't show signs of infection and, if those viruses are transmitted to poultry, they usually don't cause serious symptoms.

Yet, in 2017, the highly pathogenic H5 virus entered the country, with devastating implications for the poultry industry.



Vaccine Development

Vaccination against the virus is not allowed on chickens in South Africa; as such, the University of Pretoria ([UP](#)) joined forces with the Council for Scientific and Industrial Research (CSIR) to successfully develop a vaccine against avian influenza, using tobacco plants. This bypassed the many biosafety risks involved with using traditional live vaccine viruses. The vaccine mimics an H6-subtype influenza virus, because a strain of H6N2 is endemic in South African chickens.

Development of the vaccine resulted from a Research Chair in Poultry Health and Production, jointly established by the Southern African Poultry Association (SAPA) and UP, within the Department of Production Animal Studies at FVS at Onderstepoort.

Rabies

Rabies is a serious viral infection and the only infectious disease that carries an almost 100% mortality in any species (including humans), once clinical signs appear.

Although the disease is vaccine-preventable, South Africa is currently experiencing an unprecedented outbreak of rabies in dogs, especially in the Eastern Cape, according to Professor Andrew Leisewitz, Veterinary Specialist Physician at the UP, FVS. The National Institute of Communicable Diseases (NICD), has flagged KwaZulu-Natal as another hotspot. The NICD stresses that the increase of human rabies cases in South Africa is related to outbreaks of rabies in dogs.

FACULTY OF VETERINARY SCIENCE AT UP

The Faculty of Veterinary Science ([FVS](#)) at the University of Pretoria has a proud tradition of excellence, spanning over more than a century. It is the only institution responsible for training veterinarians and veterinary nurses in the country.



“ The faculty’s graduate and research programmes are vital to enhancing animal health and human health, promoting biosecurity and welfare, and ensuring that our production animals, wildlife and pets are safe and in good health.”

Prof Vinny Naidoo

Dean: Faculty of Veterinary Science
University of Pretoria

Facilities

Research Facilities

FVS views all knowledge generated through their research initiatives, as the cornerstone to sustainable development in our country’s economy and contributes to a globalised society, especially one built on international trade policies. Research projects are aligned with the UN Sustainable Development Goals and South Africa’s National Development Plan. FVS’s cutting-edge research activities are supported by well-equipped research laboratories.



Onderstepoort Veterinary Academic Hospital

The Onderstepoort Veterinary Academic Hospital ([OVAH](#)) is a prime training platform of the faculty. Through access to state-of-the-art equipment and professional veterinary experts covering an array of disciplines, the OVAH is able to cater for animal patients big and small - from pets to birds and wildlife, including the Big Five.

Satellite Facilities and Ambulatory Services

The education of communities on basic animal welfare is critical. It lays the foundation for better cooperation from communities to actively prevent disease through vaccination and parasite control, and to reduce overpopulation of animals through sterilisation. The faculty runs full-time and weekly mobile community animal health clinics. Veterinary services are provided to subsistence farmers who cannot always afford professional advice or certain treatments. Students are also involved in the sterilisation of animals (under supervision); many of which are done at little or no cost to the owner.

Training programmes

- Bachelor of Veterinary Science (BVSc)
- Bachelor of Veterinary Nursing (BVetNurs)
- Post-graduate: MSc, Master of Veterinary Medicine (MMedVet) and PhD.

Primary Animal Health Care

According to Professor Vinny Naidoo, Dean of the Faculty of Veterinary Science at UP, the faculty is locally relevant and passionate about meeting the needs of South Africa.

This not only applies to commercial farming, but also to primary animal healthcare, where veterinarians and veterinary nurses can assist rural communities and smallholder farmers.

In 2011, the Onderstepoort FVS (under Production Animal Studies) established a Chair in Primary Animal Health Care (PAHC) in collaboration with Afrivet, which provides indigenous solutions to animal health challenges.

Afrivet is known for innovative products, professional knowledge solutions and support services to South African animal owners, farmers, and veterinarians, through purposeful local and global cooperation.



The main objectives are:

- to develop the concept, methodology and training material used in providing PAHC;
- to coordinate and action the implementation of training in PAHC and assessment thereof; and
- to prepare veterinary students for the socio-economic responsibilities of the veterinary profession, in particular for the compulsory community service envisaged in the near future.



**World Organisation
for Animal Health**
Founded as OIE

WOAH Collaborating Centre

The World Organisation for Animal Health (WOAH, founded as OIE) has selected the Faculty of Veterinary Science and its consortium partners, through its Department of Veterinary Tropical Diseases, as a designated Collaborating Centre with the principal mandate to function as a world centre of research, expertise and dissemination of knowledge on the following specialities:

- Livestock diseases, livestock health management;
- Wildlife diseases; wildlife health management; and
- Livestock-wildlife-human interface.

Key Objectives (2022 – 2026)

- The WOAH Collaborating Centre Onderstepoort aims to offer and deliver applicable training on regional, economically important livestock and wildlife diseases, including their diagnosis and control, and embrace the One Health concept.
- The centre seeks to advance technical skills among WOAH Member Countries in the region through, among other, the deployment of experts in various fields of livestock and wildlife management, as well as hands-on skills courses. Both objectives are aimed at building capacity in animal health in the southern African region.

The activities of the centre are supported by the following institutions:

- Lead Institution: Faculty of Veterinary Science, University of Pretoria;
- ARC-Onderstepoort Veterinary Research (ARC-OVR);
- Institute of Tropical Medicine (ITM), Antwerp, Belgium;
- National Institute for Communicable Diseases (NICD); and
- Department of Agriculture, Land Reform and Rural Development (DALRRD) - Animal Health.

ARC-ONDERSTEPSPOORT VETERINARY RESEARCH CAMPUS



Research at molecular level has led to remarkable advances in understanding the genome of various pathogenic organisms. Based on this knowledge, new diagnostic tools and novel vaccines are being developed. This has enabled effective diagnostic services and production of vaccines against FMD and tick-borne diseases.

Genotyping of virus strains isolated from outbreaks, permits the origin of the outbreaks to be traced, which is of great value in situations like the recent FMD outbreaks in South Africa.

Because diseases do not respect provincial, national or socio-economic barriers, the entire South African livestock-owning population and our neighbouring countries, stand to benefit from the veterinary research carried out at ARC-OVR.

International Collaboration Centre

ARC-OVR is the collaborating centre for both the World Organisation for Animal Health (WOAH) and Food and Agriculture Organisation of the United Nations (FAO). This entails surveillance, control and emergency preparedness for transboundary animal diseases for Africa. WOAH collaboration includes seven disease centres: African horse sickness, bluetongue, FMD, rift valley fever, rabies, lumpy skin disease and African swine fever.



The ARC-Onderstepoort Veterinary Research Campus ([ARC-OVR](#)) is a flagship campus of the Agricultural Research Council (ARC) and plays an important role in maintaining the health of our national herd and wildlife. ARC-OVR has a long history of scientific achievement in terms of understanding major livestock diseases and contributions to their control - a track record that has garnered them international acclaim and support.

Research, Diagnostics and Vaccine Development

Research activities at ARC-OVR focus on the development and improvement of vaccines and diagnostic tests, applying the latest molecular biological techniques.



Food Safety

LINK TO HUMAN HEALTH

Foodborne diseases are an important part of biosecurity, as they impact directly on human health and impede socioeconomic development by straining health care systems and harming national economies.

The key to safety lies in consumer education and collaboration between government, research institutions, and the agricultural and processing industries.

CAUSES OF FOODBORNE DISEASES

- **Bacteria**
Examples: *Salmonella*, *Campylobacter*, enterohaemorrhagic *Escherichia coli* and *Listeria*.
- **Viruses**
Examples: Norovirus and Hepatitis A.
- **Parasites**
Examples: Tapeworms such as *Echinococcus* spp and *Taenia* spp; *Ascaris* and *Giardia*.
- **Chemicals Substances**
Examples: Naturally occurring toxins, such as mycotoxins and environmental pollutants, such as dioxins.

“ Biosecurity is our being; the very existence of a country; of us, as human beings.”

Billy Makhafola

Director: Food Safety and Quality Assurance
Department of Agriculture, Land Reform and Rural Development (DALRRD)

Good practices along the supply chain will ensure:

- improved sustainability;
- reduced environmental damage; and
- ability to retain more agricultural product.

According to Billy Makhafola, Director for Food Safety and Quality Assurance at [DALRRD](#), his department works closely with the Department of Health, whose mandate includes administration of the Foodstuffs, Cosmetics and Disinfectants Act.

Mr Makhafola says that regular laboratory tests are conducted and, the fact that our country exports to different destinations, predominantly within the European Union, testifies to the safety of the food we produce in South Africa.

Safe food production improves economic sustainability by enabling market access.





* Please click on the image above to view the video.

CENTRE FOR FOOD SAFETY

The Centre for Food Safety ([CFS](#)) is an applied food science research consortium comprising Stellenbosch University (SU) and the food industry.

The CFS provides stakeholders with the opportunity to develop and exchange knowledge, experience and expertise in the areas of food safety, food defence and food processing.

Consumer Information

CFS Director, Professor Pieter Gouws, says that consumer behaviour plays a major role in food safety.

To educate consumers on aspects affecting food safety, the centre shares information through its social media pages on a regular basis. A book, *Living with Little Monsters: A Household Guide to Managing the Hidden World of Microbes*, has also been published.



Research

Research themes of the CFS include the use of novel processing technologies to reduce and control foodborne pathogens and emerging pathogens; and the influence of food safety practices within retail stores.



Examples of Research Projects:

- Resistance to the disinfectant, Quaternary Ammonium Compound (QAC) in South African factories. (QAC, is traditionally used to control *Listeria monocytogenes* in factories).
- Use of UV treatment to treat polluted river water used for agricultural irrigation to ensure safer produce.
- Identification of a bacteriophage that can kill salmonella. Development of the process to reduce salmonella counts in poultry, showed very good results.





ABIPP: Key Instrument of the Agricultural Bio-Economy

As part of the implementation of the agricultural pillar of the Bio-Economy Strategy, the Department of Science and Innovation (DSI) has established the Agricultural Bio-Economy Innovation Partnership Programme (ABIPP), which is currently managed by the Technology Innovation Agency (TIA).

ABIPP is one of the key instruments for implementing the agricultural priorities of the Decadal Plan on Science, Technology and Innovation. Through programmes such as ABIPP, the DSI positions itself as a driver of innovation in support of the National Development Plan (NDP), Agriculture Policy Action Plan (APAP) and the Agricultural and Agro-processing Master Plan (AAMP).

GOAL

To increase productivity, food security and sustainable rural development.

OBJECTIVES

To ensure competitiveness and sustainability of the agricultural industry, through:

- **new product development;**
- **new processes** (including agro-processing); and
- **development and dissemination of technological services.**

FOCUS AREAS

ABIPP funds, co-funds, coordinates, facilitates and actively manages multidisciplinary, multi-institutional research programmes, focusing on bio-innovation, products, processes and services in agriculture, forestry and fisheries.

Through public-private partnerships, ABIPP addresses some key challenges and opportunities in agriculture:

- Climate change resilience
- Development of new products and prototypes
- Stimulation and development of productive value chains
 - Agro-processing
 - Evidence-based mapping
- Bio-innovation in support of food and nutrition
- Farmer development support through technology diffusion and digital decision support systems.

ABIPP AND BIOSECURITY



Plant Health

The DSI was instrumental in establishment of The Plant Health Consortium; coordinated by GrainSA in 2016; as the forerunner to the National Biosecurity Hub.

In terms of modernising agriculture and supporting interventions for the diagnostics, surveillance, monitoring and early warning systems, ABIPP funded the development of a digital platform for biosecurity. The platform is known as the Information Hub and is coordinated by Innovation Africa @UP.

The Information Hub provides the central repository for data storage; of the National Biosecurity Hub, and is a cloud-based, community-driven, and self-help data platform for trans-disciplinary research and innovation

The Information Hub entails:

- Development of a data warehouse with structural and legal considerations of managing the biosecurity data;
- Collection of relevant data sources from historical and current data; and
- Ongoing agricultural pest and pathogen surveillance, with a view to integration.
- Training for small-scale producers on tools for early detection of biosecurity threats.

A specific project was launched to monitor the main maize pests (*Busseola fusca*, *Chilo partellus*, *Spodoptera frugiperda*) across the six provinces and spanning the whole season. The scale of the exercise marked a first in South Africa.



Animal Health

Disease outbreaks could cost the industry up to R10 billion per annum.

Animal health risks are addressed through the Technology Innovation Agency ([TIA](#)) Animal Health Cluster.

The TIA Animal Health Cluster aims:

- to accelerate commercialisation of animal health biotechnology products to combat livestock diseases of strategic and economic importance;
- to bring innovation to the meat industry (including sheep and poultry); and
- to establish an aquaculture cluster

Vaccines and Diagnostics

The cluster is focused on improving the competitiveness of the industry through new vaccines and diagnostics. Revitalisation of veterinary pharmaceutical manufacturing is crucial, as South Africa continues to import the majority of its requirements at a very high cost.

The vaccines and diagnostics portfolio targets seven controlled or notifiable diseases, three globally identified zoonotic diseases, and three diseases identified as having a major impact on smallholder farmers. These diseases include blue tongue virus, African horse sickness, heartwater, lumpy skin disease and blue tick.

Point of Care (POC) veterinary diagnostics, is another area of research investment. The set-up is based on mobile laboratory systems, with samples collected in-field and rapidly analysed by polymerase chain reaction (PCR) as the epidemic spreads. The technology, spun out of the Council for Scientific and Industrial Research (CSIR) and TokaBio Pty Ltd., allows the detection of infectious livestock diseases (foot-and-mouth disease SAT1,2,3 and avian influenza) and includes tracing software.



Traceability

The Livestock Identification and Traceability System (LITS) aims to address challenges such as disease outbreaks, theft and illegal importation, which prevent the industry from being internationally competitive in all aspects of production, health and trade.

Animal identification systems have become mandatory prerequisites to international trade; and implementation thereof is critical in improving access to international markets.

[TIA](#) assisted [DALRRD](#) with development of the business case for LITS-SA (an internationally recognised traceability system). It is now being

piloted by DALRRD and, once rolled out, will allow tracking of all animals by the regulated authority. The CSIR has also been contracted by DALRRD to assist in converting paper-based documentation systems into a central database, to be hosted by DALRRD for traceability.



Aquaculture Cluster

The government has prioritised the development of an aquaculture cluster to contribute towards i.a., food security and economic development.

Aquaculture Diagnostic Kits

The support of four projects, have resulted in the release of ten prototypes. One of these, is a diagnostic kit prototype, developed by the CSIR for infectious spleen and kidney necrosis virus (ISKNV) and tilapia lake virus (TILV), which cause high mortalities in the aquaculture industry.

These diseases are quarantine pests and the CSIR is working with SANBIO to complete field trial demonstrations in Africa. The project is part of the CSIR's strategy to develop chip technologies for diagnostics.



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



technology innovation
AGENCY
Innovating Tomorrow Together



HOSTING PLATFORM FOR THE NATIONAL BIOSECURITY HUB



Innovation Africa @UP is a research investment platform designed to incubate future-focused world-class research. The strategic intent is to drive cross-disciplinary collaboration to underpin frontier research that aligns university research strengths with industry needs and government priorities.

VISION

To develop a world-class research and training platform that is committed to long-term research programmes that address important industry and government challenges.

“ Many of the big issues that we have to deal with as a country, require an integrated approach, which involves long term partnerships to address important matters such as biosecurity for South Africa.”

Prof Bernard Slippers
Senior Director at Innovation Africa @UP

With an initial focus on the future of the agricultural and forestry industries, the aim is to capitalise on the momentum, competence and opportunity that lie at the intersection of biotechnology and information technology.

The integration of biotechnology and digital technology offers a competitive advantage in the provision of research support capacity to these sectors.

OBJECTIVES

- A research investment platform that interfaces between academia, government and industry.
- Build critical research mass.
- Advance and leverage research and innovation expertise.
- Training platform for new generation of researchers.
- Precision Agricultural and Forestry services.
- Portfolio of climatically diverse research field plot sites.
- Promote socio-economic development.
- A Pan-African research centre of excellence.

CORE DRIVERS

Research training

- Research programmes
- Satellite Labs

Research supporting infrastructure

- Specialised research services provision (linked to research training)
- Digital infrastructure (aiding frontier research training)

Capacity development

- Internship programme

October 2022

NATIONAL BIOSECURITY HUB



Agriculture, Land Reform and Rural Development
Science and Innovation

