	DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT
	BOVINE BRUCELLOSIS CONTROL POLICY, SOUTH AFRICA
POLICY OWNER/ COORDINATOR:	**Directorate Animal Health**
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Executive summary

Livestock production and the consumption of animal products are crucial to the nutritional well-being and food security of millions of people within South Africa. Bovine brucellosis caused by *Brucella abortus* bacteria, is a chronic herd disease that negatively impacts on cattle production and reproduction. Brucellosis can infect humans and cause debilitating disease. The most effective way of reducing the impacts of the disease on agricultural production and preventing human infection is to control this disease in the cattle population.

The purpose of this policy is to set out and clarify the broad framework of the disease control strategy to be followed for bovine brucellosis in cattle.

The recommended policy option calls for the development and implementation of a national bovine brucellosis control policy (strategy) based on a multipronged stepwise approach of defined activities. It aims for improved disease control and a decrease in prevalence. The policy objectives identified include: (i) enforced compulsory vaccination of all heifer calves between 4-8 months of age with a registered vaccine, with potential booster vaccination of adult cows with a relevant registered vaccine, and identification of all vaccinated calves and cows; (ii) continued active education and awareness on bovine brucellosis; (iii) legislated compulsory testing of all cattle (herds); (iv) disease control through quarantine and movement control; (v) slaughter of brucellosis positive cattle/herds at an approved/ registered abattoir; (vi) improved reporting of necessary data; and (vii) improved implementation of legislation and policy. The same central policy is to be applied across all 9 Provinces.

Implementation plans for the policy objectives will be broken down into short, medium, long term and continuous goals which will be fully described and consulted on before they are implemented. This will include budget determinations and socio-economic impact assessments. The achievement of these goals will be partially dependent on the availability of human and financial resources. The policy needs to be implemented as a multipronged stepwise approach with regular re-evaluation of the goals achieved on a yearly basis. As certain goals are achieved the focus can be shifted to achieving subsequent goals.

In terms of the Veterinary Strategy, as adopted in 2016, an effective, implementable and sustainable brucellosis control policy will also be used as a model for other diseases in future as this policy will lay the foundations required for effective disease control efforts.

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1.DEFINITIONS & ACRONYMS

Definitions:

Animal - means any mammal, bird, fish, reptile or amphibian which is a member of the phylum vertebrata, including the carcass of any such animal.
Animal identification - means the marking of an animal, individually or collectively, by its group, with a unique individual or group identifier, as per the Animal Identification Act, 2002 (Act No. 6 of 2002).
Animal traceability - means the ability to follow an animal or group of animals.
Authorized person - means any person authorized to exercise or perform any power or duty, or requested to render any service, by the director under section 3 (1) as per the Animal Diseases Act 1984 (Act 35 of 1984);
Bovine brucellosis – Brucellosis as caused by *Brucella abortus* bacteria which primarily infects cattle. Mammals other than cattle, and including humans, may become infected with bovine brucellosis.
Cattle – refers to *Bos taurus* and *Bos indicus* species, and also water buffalo.
Infected animal - in relation to a controlled animal disease specified in column 1 of Table 2 of the Regulations, means a susceptible animal that is infected, or is on reasonable grounds suspected to be infected with the controlled animal disease concerned;
Officer or designated official - means a person or body officially appointed to a task or duty by the DAH of DALRRD under Section 3 "Authorized Persons" of the ADA and Regulations.
Owner - means, in relation to any controlled animal or thing, or any other moveable property, the person in whom the ownership in respect of such animal, thing or property is vested, including the person having the management, custody or control of such animal, thing or property, or having it in his possession for purposes of any treatment or care or, for the purposes of sections 9 (2) and 11 (1) (b), in the case of wild or foreign animals found on land or among animals, the owner or manager, or owner, respectively, in respect of such land or animals (as per the ADA).
Quarantine - means the isolation of susceptible animals in a quarantine facility or on a holding which has been approved by a State Veterinarian (SV) or an official authorized by the Director: Animal Health (DAH), for a specific purpose, for a specified period to prevent exposure to, or spread of infection. Refer to the Animal Diseases Regulations (R.2026 of 1986), Regulation 13 "Isolation of Controlled Animals or Things".
Responsible person - means a manager or owner of land or an owner of animals.
Responsible State Veterinarian - means that SV who, in an area determined by the department, is responsible for the control of animal diseases.
Susceptible animal - in relation to a controlled animal disease specified in column 1 of Table 2 of the Regulations, means an animal of a kind specified in column 3 of the said Table opposite the controlled animal disease in question.
The Act - unless otherwise specified means the Animal Diseases Act 1984 (Act 35 of 84) and includes the Animal Diseases Regulations, R2026 of 26 September 1986, as amended.
Veterinarian - means a qualified veterinarian according to the Veterinary and Para-veterinary Professions Act (Act No. 19 of 1982) and registered with the South African Veterinary Council.

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Veterinary Authority - means the Governmental Authority, comprising veterinarians, other professionals and paraprofessionals, having the responsibility and competence for ensuring or supervising the implementation of animal health and welfare measures, international veterinary certification and other standards and recommendations in the whole territory.

Veterinary Services – means the governmental and non-governmental organisations that implement animal health and welfare measures and other standards and recommendations in the territory. The Veterinary Services are under the overall control and direction of the Veterinary Authority. Private sector organisations, veterinarians, veterinary paraprofessionals or aquatic animal health professionals are normally accredited or approved by the Veterinary Authority to deliver the delegated functions.

Wildlife (game) - means all animals that are not cattle, equines, sheep, goats, pigs, poultry, domesticated cats or dogs, amphibians, reptiles, fish or birds, but shall not include animals in respect of which the owner is the holder of a licence issued in terms of the Protection of Trained Animals Act, 1935 (Act 24 of 1935). [Performing Animals Protection Act, 1935 (Act 24 of 1935)]

Acronyms:

ADA	Animal Diseases Act 1984 (Act no 35 of 1984) and Animal Diseases Regulations (R2026 of Sep 1986) as amended.
AHT	Animal Health Technician
AIDA	The Animal Identification Act, 2000 (Act no 6 of 2000)
AIRT	Animal Identification, Recording and Traceability system
CCS	Compulsory Community Service
CFT	Complement Fixation Test
DAH	Directorate: Animal Health
DALRRD	Department of Agriculture, Land Reform and Rural Development
D:FIES	Directorate: Food Imports and Export Standards
FAO	Food and Agriculture Organization of the United Nations
LITS	Livestock Identification and Traceability System
MinTech-VWG	Ministerial Technical Committee Veterinary Working Group (an interdepartmental technical working group between the national and provincial departments of agriculture that gives advice on veterinary issues)
MRT	Milk Ring Test
NAHF	National Animal Health Forum
NDP	National Development Plan
OIE	Office International des Épizooties (World Organization for Animal Health)

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PAHF	Provincial Animal Health Forum
PEO	Provincial Executive Officer - Government official in charge of Veterinary Services in the Province (either the Provincial Director or the Provincial Chief Director of Veterinary Services)
PPE	Personal Protective Equipment
PVS	Performance of Veterinary Services evaluation
RBT	Rose Bengal Test
SANAS	South African National Accreditation System
SAPS	South African Police service
SAVC	South African Veterinary Council
SOP	Standard Operating Procedure
SV	State Veterinarian/ Official Veterinarian
The Regulations	Animal Diseases Regulations, R2026 of 26 September 1986, as amended
VPN	Veterinary Procedural Notice
WHO	World Health Organisation

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2. INTRODUCTION

Livestock production and the consumption of animal products are crucial to the nutritional well-being and food security of millions of people within South Africa. Animal derived protein (milk and meat) plays an important role in the food industry and is an important contributor to safe, abundant and affordable high quality protein for a growing population.

Bovine brucellosis caused by *Brucella abortus*, is a chronic herd disease that negatively impacts on cattle production and reproduction by causing abortions, still-born and weak calves, retained placentas, decreased milk yield and reduced fertility in bulls. Brucellosis is zoonotic and can infect humans through consumption of raw milk, through slaughtering infected animals without protection and through handling of aborted foetuses and afterbirths of infected cows. Debilitating disease ensues if humans are infected which may become recurrent or chronic if not treated efficiently in a timely manner. The most effective way of reducing the impacts of the disease on agricultural production and preventing human infection is to control this disease in the cattle population.

The existing legislative framework (Bovine Brucellosis Scheme R.2483 of 9 Dec 1988) reflects some of the internationally recognized principles of controlling bovine brucellosis by established vaccination, test and slaughter methods. When government funding and manpower available for the control of this disease was prioritised nationally and the general compliance of livestock owners with regulatory requirements was high, this Scheme achieved good control of bovine brucellosis and the occurrence of the disease was very low in the mid- to late 1980s. Since the responsibility of continued testing and vaccination was handed over to livestock owners in the late 1980s and the provincialized structure was introduced in 1994, a gradual increase in the occurrence of the disease has been observed, mainly due to non-compliance with the prescribed control measures. This policy explores options for reversing this trend.

Cattle farming comprises of different types and classifications of enterprises and these need to be taken into account during policy development. Currently, the compliance of livestock owners with the applicable bovine brucellosis legislation and the enforcement thereof by government is severely lacking. In addition, experience has shown that livestock diseases cannot be controlled by law enforcement alone and that socioeconomic dynamics play a critical role in determining success. The envisaged new policy approach thus needs to provide for a collaborative effort of government together with all relevant role players, pursuing a common goal of reducing the occurrence of bovine brucellosis. The relative contributions and required collaboration of all stakeholders, including State Veterinary Services, livestock owners, farmer associations, stud breeders associations, private veterinarians, laboratories, abattoirs, milk processing facilities and other industry role players are thus important considerations in designing a sustainable future strategy.

It is against this background that the South African government reviewed the current situation and policy approach with the view to provide more effectively for control of bovine brucellosis to benefit both animal health and production, and human (public) health.

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The approach is in line with the South African Veterinary Strategy (2016-2026). Extensive consultations during the formulation of the Strategy suggested strongly that a strategic focused bovine brucellosis control programme should serve as a pilot project and model for the strengthening of Veterinary Services as a whole. The National Animal Health Forum (NAHF), which represents numerous industry bodies, together with government established a Brucellosis Steering Committee at the end of July 2016. This Committee embarked on formulating an intensive brucellosis awareness campaign during the last quarter of 2016 and the first quarter of 2017, as well as ongoing education and information drives to inform farmers and members of the public on brucellosis. The Bovine Brucellosis Working Group of the Ministerial Technical Committee Veterinary Working Group (MinTech-VWG), an interdepartmental technical working group between the national and provincial departments of agriculture that gives advice on veterinary issues) consists of Provincial Veterinary representatives, laboratory specialists and DALRRD Animal Health and Veterinary Public Health delegates. The Bovine Brucellosis manual was signed in September 2016 and this manual replaces previous guidelines on the implementation of brucellosis control measures.

In order to promote the buy-in of all stakeholders and role players into the final revised bovine brucellosis policy, an all-inclusive approach has been chosen by releasing a Discussion Document on the Review on Bovine Brucellosis Control for an initial round of public consultation prior to compiling a draft policy. This "Discussion Paper on the Review of Bovine Brucellosis Control in South Africa" was published in the Government Gazette No. 40827 of 5 May 2017 for public comment. Comments were received and have been processed and considered by the Directorate: Animal Health and shared with the Bovine Brucellosis Working Group and Brucellosis Steering Committee and fed into the final policy document.

It needs to be noted that this policy, which focuses on the control of *Brucella abortus* in cattle, does not supersede control measures prescribed in the Act. As per Table 2 of the Regulations any detection of *Brucella abortus, B. melitensis, B. canis* and *B. suis* in the listed susceptible animals (cattle, sheep, goats, pigs and dogs), although not limited to these species, shall be dealt with as prescribed in the Act. *Brucella abortus* may infect many other susceptible species (mammals) and is not limited to cattle. Furthermore, cattle may also become infected with other *Brucella* spp. e.g. *Brucella melitensis*. Multiple species of animals are often kept or grazed together, which may cause inter-specie transmission of *Brucellosis* spp. Such occurrences will be dealt with accordingly.

Specific control measures for brucellosis infection in buffalo and for *Brucella melitensis* are described in the specific Procedural Manuals.

International obligations and standards:

World Organization for Animal Health (OIE) – The OIE Terrestrial Animal Health Code chapter 8.4 addresses "Infection with *Brucella abortus*, *B. melitensis* and *B. suis*" - The aim of the chapter being to mitigate the risk of spread of, and the risk to human health from, *Brucella abortus*, *B. melitensis* and *B. suis* in animals. The OIE Manual of Diagnostic Tests

and Vaccines for Terrestrial Animals 2018 chapter 2.1.4. addresses brucellosis diagnostic standards.

Food and Agricultural Organization of the United Nations (FAO) – In 2003 the Animal Production and Health Division of the FAO Agriculture Department published the "Guidelines for coordinated human and animal brucellosis surveillance", which focusses on development of efficient surveillance systems to guide disease control programmes. An article was published in July 2014 titled "FAO works to curb the burden of brucellosis in endemic countries - Case studies from Eurasia and the Near East". This article summarised the FAO efforts to address the global threat of brucellosis for the benefit of both animal health and public health, through the advancement of practical knowledge and experience of brucellosis in various countries and helping with the development of sound strategies and policies for sustainable control programmes.

World Health Organisation (WHO) - In 2006, the WHO published "The control of neglected zoonotic diseases - A route to poverty alleviation: report of a joint WHO/DFID-AHP meeting, 20 and 21 September 2005, WHO Headquarters, Geneva, with the participation of FAO and OIE." This report identified Brucellosis a neglected tropical disease, as well as one of the world's most widespread zoonoses. The report also focuses on the control of zoonoses as a cost-effective opportunity for poverty alleviation.

World Trade Organisation (WTO) Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures - The WTO SPS Agreement outlines international obligations and food security standards and it provides rules for the protection of human, animal or plant life or health. Countries have the right to take SPS Measures necessary for the protection of human, animal or plant life or health, provided that such measures are not inconsistent with the WTO SPS Agreement. The level of Brucellosis control in the country will play a role in determining the risk mitigation measures that South Africa can place on imports of animals or animal products where Brucellosis may be a risk. Likewise, trading partners will view imports from South Africa in a more favourable light if Brucellosis is controlled effectively.

Policy scope

The bovine brucellosis policy will be used as a guideline for bovine brucellosis control and prevalence reduction in cattle.

Relevant legislation

Animal Diseases Act (Act No. 35 of 1984)
Animal Diseases Regulations (R.2026 of 1986)
Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) and the accompanying guidelines (Bovine Brucellosis Manual, September 2016)

Status of the issue being addressed

Bovine Brucellosis is currently not under control in South Africa. It has been identified as a priority disease and a model for disease control in the South African Veterinary Strategy

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(2016-2026). Globally, brucellosis has been identified as a neglected re-emerging zoonosis by the OIE, WHO and FAO.

Purpose of developing the policy

- To set out and clarify the broad framework of the disease control strategy to be followed for bovine brucellosis control in cattle.
- To provide guidelines on roles and responsibilities for the implementation of the policy and to identify areas where it will be required to amend legislation.

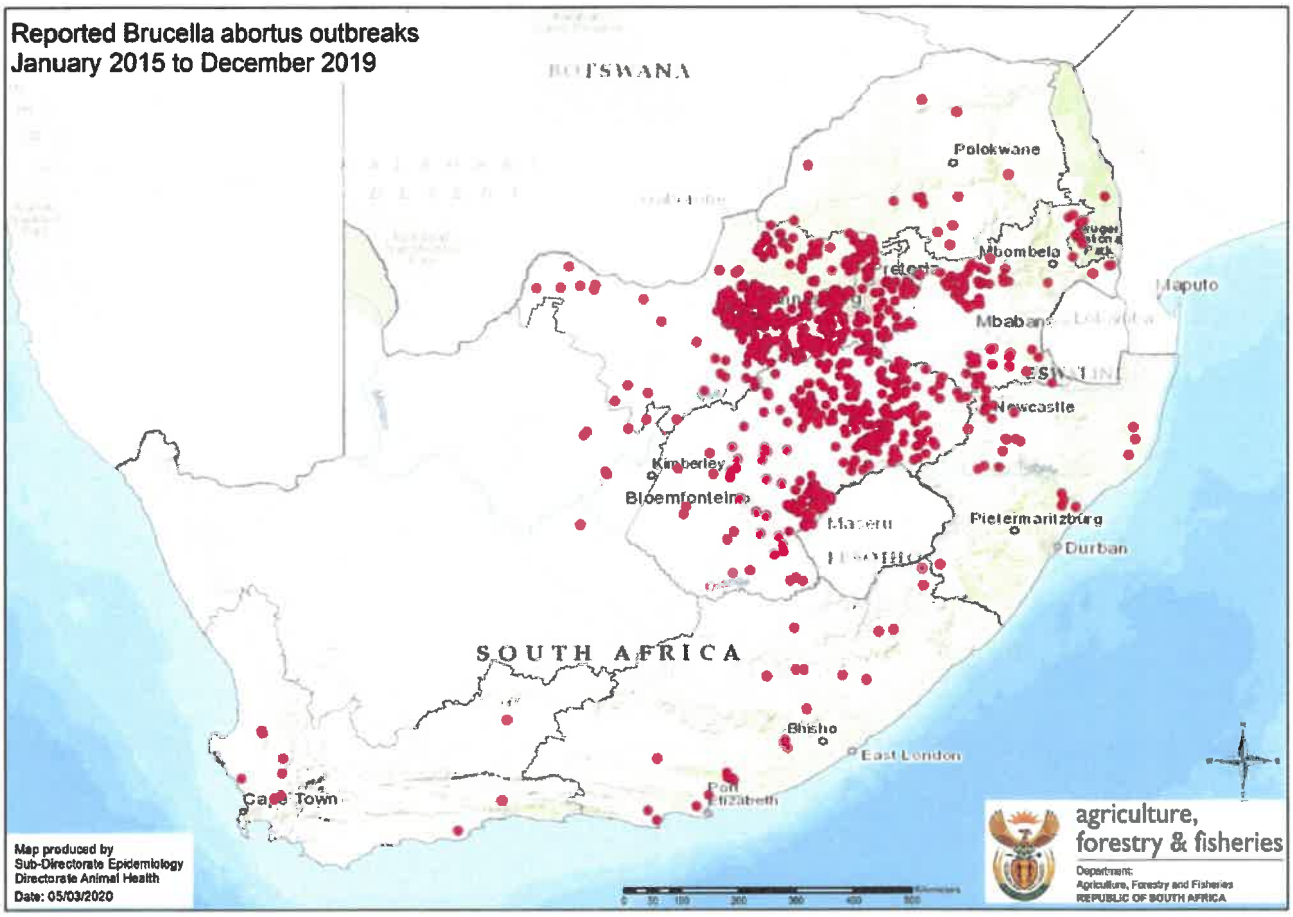
Note: The **policy objectives** and proposed **policy option** have been finalised and agreed upon in principle, and allows for further development of more detailed implementation plans on each objective.

3. PROBLEM STATEMENT

Although the true prevalence of bovine brucellosis is currently unknown, the disease is widespread across the country based on disease reports sent monthly by the Provincial Veterinary Authorities to DALRRD: DAH Epidemiology (Figure 1). The current Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) lays the foundation for control and eradication of the disease, but has several shortcomings and is poorly implemented and adhered to.

Between January 2015 and December 2019, 1050 new *Brucella abortus* outbreaks were reported to DALRRD DAH Sub-Directorate: Epidemiology via monthly reports. Outbreak reporting is predominantly based on *B. abortus* serology with culture confirmation where possible. This number is assumed to be an underrepresentation of the actual extent of the disease, as not all herds are tested and not all cases are effectively reported. Brucellosis control efforts are currently disjointed, inconsistent and not adequately funded. There is a current trend of a provincialised and even regionalised response to brucellosis control. A clear policy is required on the control and prevalence reduction of bovine brucellosis in cattle that should include a clear national (central) implementation plan. A revision of the Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) is required to enhance its effectiveness and scientific validity. An effective, implementable and sustainable brucellosis control policy will be used as a model for other diseases in future, as this policy will lay the foundations required for effective disease control efforts.

Figure 1 – Reported new Brucella abortus outbreaks in South Africa –between January 2015 and December 2019.



Public consultation response of the Discussion paper

The following is a summary of the public comments on the "Discussion paper on the review of bovine brucellosis control in South Africa":

a) Compulsory testing of all bovines within South Africa for bovine brucellosis

Basically all were in agreement with compulsory testing and that it should be applied to all cattle, including commercial dairy, commercial beef, communal cattle.

- It is critical to consider capacity to get this done successfully.
- Auctions and abattoirs were mentioned as critical control points to be considered.
- Testing must be incentivised, rapid and of standard format.
- Suggestion for State to focus on communal areas and positive herds.
- Need for improved record keeping on farms and within communities.
- Implementation documents need to distinguish between sampling and testing and the role of the Veterinary Technologist should be added.

b) Prohibition of the movement of live animals from herds infected with bovine brucellosis other than for purposes of slaughter

Basically all were in agreement that test negative cattle should not be moved from quarantined herds and agree with the principle of movement restrictions.

- Compulsory C-branding should be enforced – most agreed and reiterated the importance of this point.

- Most were in favour of dedicated feedlots that can receive brucellosis positive cattle and heifers born from infected cows – the feedlot to be recognised as an end-point destination (proof that all animals are sent to abattoir for slaughter) and will require relevant unique individual animal identification, recording and traceability for auditing.

c) Improved implementation of compulsory heifer vaccinations for brucellosis

Some suggestions on vaccination protocols and identification of vaccinated animals were provided.

- Many feel the vaccines should only be administered by veterinarians or AHT's; others are of the opinion it would be difficult due to a lack of manpower.
- Identification of vaccinated cattle should be applied and ideally needs to be visual and uniform.
- Important to consider capacity to get vaccination done successfully.
- Improved record keeping is required.
- Improvement of compliance if owners are still allowed to vaccinate requires deliberation.

d) Optimization of the test and slaughter control measures for bovine brucellosis in infected herds

Some stated that incentives for testing are required; others stated that testing and slaughter is already in the best interest of all as production is higher if the disease is absent.

- Incentives, if used, should not necessarily be monetary.
- Need to standardise abattoir slaughter protocols of brucellosis cattle – many abattoirs refuse to slaughter these cattle or add exorbitant additional costs for Personal Protective Equipment (PPE), which affects the willingness of owners to have these cattle slaughtered.

e) Compulsory abortion notification

Some were in favour of compulsory abortion notification and some were not.

- Resources, sample collection & transport and implementation of legislation were questioned.
- Problem of teaching owners to take correct samples and get samples to the laboratory in time and in a usable condition.

f) Diagnostic reporting format for laboratories

In general, a standard format of sample submission, a centralised database and standard testing protocols are required.

- Most stated that laboratories need to be supported and funded to enable accreditation according to international standards and maintenance of staff capacity.
- Important to ensure that reagents are continuously available for testing.
- The testing turnover time needs to be improved.

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- Accreditation and DAH approval of private laboratories for brucellosis testing needs to be considered.

g) Establishment of a fair, equitable and sustainable "responsibility and funding system" for bovine brucellosis control

Levy systems were mentioned (abattoir, livestock sales, etc.) and most were in favour of private-public-partnerships in terms of funding brucellosis control.

- Requires further discussion as categories, responsibilities and contributions need to be defined.
- Good databases are essential for control (provincial and central level).

h) Establishment of an affordable and sustainable compensation system for slaughtered cattle that presents an incentive for the control of bovine brucellosis

Levy systems were mentioned, e.g. compulsory levy for all animals slaughtered at a registered abattoir.

- Many not in favour of compensation for infected cattle.
- If compensation is considered, many feel that it should be done on a sliding scale based on biosecurity/ risk mitigation measures in place.
- Many rather suggested incentives to slaughter infected cattle.
- Communal areas often do not want monetary compensation if cattle are slaughtered – have to consult with communities to establish needs.
- Many of the opinion that a positive animal is only worth its slaughter value (as the carcass can still be sold).

i) Availability of manpower and other resources to test for bovine brucellosis and to apply the control measures

Basically all were in agreement that manpower and resources need to be addressed.

- Increase employment of Veterinary Technologists for laboratory testing.
- Keep in mind that even if private sampling is conducted it will add to government testing costs – transport, laboratory running costs, reagents, tubes, etc.
- Use of ELISA test suggested.
- Use of Compulsory Community Service (CCS) veterinarian work force should be deliberated with the responsible entity.
- Suggestion to conduct abattoir level surveillance – but not feasible if cattle cannot be traced back to origin for disease control.
- Important to fill State vacancies.
- Most reiterated public-private-partnerships instead of enlarging the capacity of the State.

j) Opportunity to use the required identification of brucellosis vaccinated and tested cattle to pilot the proposed national LITS

Most were in favour of pilot projects which involves the proposed national livestock identification and traceability system (LITS).

- Can combine LITS with brucellosis vaccination and testing activities - streamline the LITS programme with the brucellosis control programme.
- Highlighted the importance of entering identification data into a central database and not just tagging cattle.

k) Resources for rural assistance and general information and education campaigns.

It is important to involve industry in this matter.

- Require education of industry, communities, cattle farmers and keepers, public, veterinary staff, etc.

l) Minimisation of the risk of transmission at the livestock-wildlife interface

The livestock-wildlife interface was noted as a point of concern.

- Vaccinate cattle surrounding wildlife farms.
- Issues with national borders experienced – should ideally be prioritised areas for LITS and Brucellosis vaccination and testing activities.

m) Incorporation of industry initiatives to control brucellosis

Co-operation between all role-players is required.

- Involve Studbook, sales yards, auctioneers, feedlots, abattoirs.
- Levies to be collected to help fund brucellosis control programme.
- Example provided of successful DALRRD collaboration with the Ostrich industry.
- One Health Forums (One Health is the integrative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment) should be involved.

n) Other

- Issues relating to the Lesotho border were mentioned – this is a high risk area for cattle movement across borders. Ideally should prioritise cattle in such areas for LITS and brucellosis vaccination and testing.
- Phased-in approach may be required for implementation of brucellosis control policy.
- Political will and support is a critical requirement for the success of the ongoing implementation of the brucellosis control policy.

Key areas to be taken forward from the Discussion document

The following summarised key areas to be addressed in this policy were identified after the publication of the "Discussion paper on the review of bovine brucellosis control in South Africa" and subsequent evaluation of public comments received:

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1.1. **Vaccination:** South African cattle are vulnerable to outbreaks of brucellosis due to a major lack of herd immunity. Vaccination of 4-8 month old heifers against brucellosis is a requirement of the Animal Diseases Regulations (R.2026 of 1986) under the Animal Diseases Act (Act No. 35 of 1984). Based on vaccination sales figures, only an estimated figure of <15% of female calves are vaccinated annually.

1.2. **Education:** Awareness of brucellosis is severely lacking across all cattle farming sectors. Accurate information on brucellosis and how the disease should be controlled is inadequate among veterinary and para-veterinary professionals. Awareness of brucellosis as a potential public health problem is severely lacking among medical professionals and the disease is very seldom considered as a differential diagnosis in relevant populations.

1.3. **Testing:** Testing is currently voluntary under the Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) and only becomes compulsory for infected herds or herds suspected to be infected. Dairy herds are required to be tested for brucellosis for the sale of raw milk under the Foodstuffs, Cosmetics and Disinfectants, 1972 (Act No 54 of 1972) as amended, but this legislation is not enforced effectively. Commercial milk buyers enforce some brucellosis testing of dairy herds as well, mainly because of export requirements set by the countries of destination. However, this still leaves a gap where especially beef and communal farmers simply do not test their herds and farm with cattle of an unknown status, endangering their own herds and those of others they sell to.

1.4. **Movement control:** The Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) states that cattle that test negative twice (minimum of three months apart) that originate from an infected herd may be moved. This is no longer regarded as best practice. Brucellosis can have a very long incubation period (2 weeks to >18 months) and two tests, 3 months apart simply does not suffice to mitigate risk. Based on current scientific knowledge, heifers that are born with latent brucellosis infection often only test positive after their first calving. No system for unique individual animal identification and movement control for cattle currently exist, but it is in process of being developed as the Livestock Identification, Traceability System (LITS). Test positive animals may not be used for further breeding and trading purposes to prevent the spread of the disease.

1.5. **Slaughter:**

1.5.1. The Bovine Brucellosis Scheme (R.2483 of 9 Dec 1988) states that all brucellosis infected cattle should be slaughtered, as effective treatment is not available to cure the disease. The meat from brucellosis cattle that are slaughtered at a registered abattoir is declared fit for human consumption if no other carcass pathology is present. A lack of standardised information for the slaughter of brucellosis infected cattle was identified, hence a SOP for the safe and correct slaughter of brucellosis infected animals is in the process of being developed and should also be used as a guide to estimate additional costs incurred during the slaughter process. Abattoirs often inflate slaughter fees for animals declared brucellosis infected, yet the brucellosis status of the majority of cattle slaughtered on a daily basis is unknown, putting abattoir workers' health at risk.

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1.5.2. The farmer receives the slaughter value of an infected animal. There is currently no sustainable compensation system for breeding animals slaughtered for brucellosis control.

1.6. **Reporting:** A standard detailed brucellosis database format is not utilised across all provinces and reporting from the provinces varies in quality and consistency. The current national disease reporting system database does not contain adequate variables to monitor and evaluate necessary trends. Additionally, accurate cattle census data is lacking in most areas and provinces, which makes it difficult to calculate the true prevalence of brucellosis and conduct accurate surveillance.

1.7. **Effective implementation of control measures:** Implementation of the current legislation is inconsistent and insufficient. Resource constrains limit government capacity and ability, while no formal public-private-partnerships exist to cover this gap. Laboratory capacity for testing, although improved over the last few years, is still lacking and requires on-going improvement. Most cattle owners are currently not taking responsibility to protect their cattle herds against brucellosis. Many owners avoid establishing their herd's brucellosis status to evade potential control measures and thus contribute to irresponsible spread of the disease from herds with an unknown health status. No critical control points (e.g. at auctions, feedlots and abattoirs) are in place to monitor adherence to policy. Feedlots and abattoirs are currently not all equipped to safely and effectively handle cattle received from positive or "unknown status" herds.

4. OBJECTIVES OF THE POLICY

The objectives of reviewing the current approach to bovine brucellosis control in South Africa are to:

- Provide more effectively for the control of bovine brucellosis in South Africa, following a national standard.
- Ensure the promotion of animal health and human health through an appropriate bovine brucellosis control strategy.
- Promote collaboration between the government and private sector to enhance bovine brucellosis control.
- Reflect internationally recognised principles, standards and strategies to control bovine brucellosis.
- Better align the regulatory framework with departmental priorities related to food security, economic growth and rural development. The socio-economic and political environment needs to be taken into account for successful disease control.

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Specific objectives of the policy:

The policy objectives were finalised and agreed upon in principle and require further development of more detailed implementation plans on each objective.

1.1. **Vaccination:** The herd immunity of South African cattle should be addressed and improved through implementing widespread vaccination to increase the percentage of heifers vaccinated per year. According to the European Commission - Working Document on Eradication of Bovine, Sheep and Goats Brucellosis in the EU: >80% of heifers have to be vaccinated each year. Individual farmers will benefit from enhancing their herd's immunity and the whole farming community of the country will benefit if we can successfully enhance the national cattle herd's immunity. Improved herd immunity will assist with disease control efforts and slowing down the spread of disease under certain conditions.

1.2. **Education:** The people involved with cattle rearing and production, those with high risk jobs (e.g. veterinarians, abattoir workers, laboratory personnel, etc.), as well as at risk members of the public will benefit from education and awareness efforts through improved knowledge on animal and public health, which should influence their behaviour and practices. Standardised and regular training of veterinary and para-veterinary professionals should be used to assist with effective implementation of brucellosis control measures.

1.3. **Testing:** Brucellosis is a herd disease, requiring a total herd test to determine the brucellosis status of the epidemiological unit. Improved testing efforts will assist in identifying valuable negative herds, as well as positive herds that need to be quarantined to prevent further disease spread. This will benefit the national cattle herd and cattle farmers in general. Testing efforts should fall under the responsibility of both the sender/ seller of cattle and the buyer of cattle. The main negative impact will be on quarantined brucellosis positive farms where the disease will have to be eradicated before the quarantine can be lifted.

1.4. **Movement control:** No infected or susceptible animals may be moved off an infected property (quarantine) to prevent the spread of infection. The responsibility of movement control should be the responsibility of both the sender/ seller of cattle and the buyer of cattle. Movement control will benefit cattle farmers to prevent them from obtaining brucellosis positive animals into their own herds. Movement control will assist to stop the spread of disease from brucellosis positive farms.

1.5. **Slaughter:** Cattle farmers would benefit if they can sell infected cattle (especially heifers) to feedlots and consumers would benefit if these animals can be safely fattened and safely slaughtered. Immediate removal of positive cattle from positive farms (for slaughter) would assist with quicker eradication of disease from the affected farm. Standardised slaughter procedures for infected cattle and cattle of a high risk and unknown disease status will assist with the prevention of potential disease transmission to abattoir workers. A standardised protocol should also assist with standardising any additional costs required for slaughtering such cattle.

1.6. **Reporting:** Accurate cattle census data is required in all areas and provinces to make the brucellosis database more useful. A good, well maintained brucellosis database is

beneficial for trend analysis to determine if applied control measures are in fact effective in controlling and reducing the brucellosis disease burden (number of new outbreaks). This will enable well-informed decision making as policy implementation progresses.

1.7. **Effective implementation of control measures:**

Improved implementation strategies and roll-out will benefit the entire livestock farming community across the country, as this policy is also intended to be used as a model for other disease control efforts. Specifically, improved implementation will decrease the brucellosis disease burden and decrease its risk to both animal and human health.

5. STRATEGIC SIGNIFICANCE

As specified in the Veterinary Strategy (2016-2026), bovine brucellosis is seen as a model disease in terms of animal disease control. By implementing an effective, efficient and sustainable bovine brucellosis policy we will be addressing the challenges that currently exist regarding multiple animal health issues. From this foundation, it will be much easier to address additional animal health issues using the implemented disease control framework and resource structure.

The above objectives will address key notes of the DALRRD Mission Statement by developing and sustaining a sector that contributes and embraces:

- Economic growth and development (in the livestock sector through increased animal production and reproduction).
- Direct job creation (through expanding the Veterinary Services work force) and indirect job creation through promoting job security on farms from sustainable and growing beef and dairy livestock enterprises.
- Rural development (will aid in bringing Veterinary Services to rural communities and provide a source of direct contact).
- Food safety & security (increased livestock production and reproduction, safe utilisation of meat, safer milk).
- Improved market access for the export of cow milk, beef and other cattle products (where negative brucellosis tests or a declaration of no restriction is required).

Furthermore, the objectives of the review are in line with:

- The strategic objectives of the South African Veterinary Strategy that was consulted extensively during the first half of 2016.
- The essence of the NDP (National Development Plan).
- APAP (Agricultural Policy Action Plan).
- Operation Phakisa: Agriculture, Land Reform and Rural Development that was consulted extensively during 2016 and is still ongoing.

6. POLICY OPTIONS

Option 1: Continue with the current Bovine Brucellosis Scheme at the current implementation level

While a principle element of private responsibility for animal disease control is entrenched in the prevailing legislation, government involvement is guided by the principle of public interest. The abolishment of brucellosis control is not a viable option because: the disease is transmissible to and able to cause disease in humans; the disease can be regarded as a trade sensitive issue and poses a potential serious threat to South Africa's international trading status; and the disease is more effectively managed by collective control strategies than by the efforts of an individual animal owner.

Current bovine brucellosis control implementation is provincialised and is not guided through a coherent central national strategy. Current implementation levels are severely lacking in terms of vaccination of heifers and testing of cattle herds. At this stage the whole country is seen as endemic and all animals are seen to be at risk of acquiring bovine brucellosis and should therefore be tested. This is not possible with the current lack of resources and a national (central) control policy structure, strategy and a useful database.

As seen from all the above, the current situation is unsatisfactory and doesn't comply with international best practice. As a matter of fact, all private and public expenditure on the current bovine brucellosis programme is wasted, because except for clearing the occasional individual herd of disease, no overall impact in reducing the overall prevalence in the country can be demonstrated. Continuing as per status quo is not cost effective and not successful in controlling the disease. A chronic disease like brucellosis cannot be controlled in patches and requires a clear national strategy that can be implemented effectively, efficiently and sustainably in all nine Provinces. If government control of bovine brucellosis is abandoned, vaccination and testing would become completely voluntary and the Department of Health would have to continue to manage zoonotic cases in humans. As explained above, this is not a viable option.

Option 2 (selected option): Develop and implement a national bovine brucellosis control policy (strategy) based on a multipronged stepwise approach of defined activities

This policy option aims for improved disease control and a decrease in prevalence. It would call for (i) enforced compulsory vaccination of all heifer calves between 4-8 months of age with a registered vaccine, with potential booster vaccination of adult cows with a relevant registered vaccine, and identification of all vaccinated calves and cows; (ii) continued active education and awareness on bovine brucellosis; (iii) legislated compulsory testing of all cattle (herds); (iv) disease control through quarantine and movement control; (v) slaughter of brucellosis positive cattle/herds at an approved/ registered abattoir; (vi) improved reporting of necessary data; and (vii) improved implementation of legislation and policy. The same central policy is to be applied across all 9 Provinces.

Policy and relevant control measures are to be instituted using a multipronged approach countrywide to ensure that all Provinces are aligned in the effort to control brucellosis. All objectives should be addressed at once, but will be implemented as a multipronged stepwise approach. This will assist with the review of progress made to enable advancement to the next stage of implementation, as relevant to different production systems and areas. Development of implementation plans for the policy objectives, as mentioned below, will be fully described and consulted before they are implemented. This will include budget determinations and socio-economic impact assessments as required.

Outline of implementation of the policy objectives:

(i) Vaccination

- Develop and implement a compulsory national bovine brucellosis vaccination strategy with visual permanent identification of vaccinated heifers and record keeping.
- Start by focussing on awareness and vaccination for a set number of years to aim to cover at least 80-90% of breeding pool over the next 10-15 years) to improve the immunity of the national cattle herd and decrease potential shedding of the bacteria. Note that compulsory vaccination will be ongoing to maintain coverage of the national cattle herd.
- Vaccine needs to be readily and consistently available and any vaccine manufacturing and procurement issues need to be sorted out as a matter of priority and urgency.

(ii) Education and awareness

- Develop and implement an education strategy for veterinary and para-veterinary professionals. Veterinary and para-veterinary professionals need to be adequately trained on the correct approach to controlling the disease. We also need to ensure that they are sufficiently trained to enable them to conduct appropriate awareness and education campaigns. This education and training should be ongoing to maintain veterinary and para-veterinary expertise.
- Develop and implement an awareness strategy. Knowledge, attitude and practices assessments should ideally be conducted to identify the most effective training and education strategies with a view to change behaviour and practices that spawn risk factors for brucellosis spread in animals and humans. Awareness campaigns should be conducted across all cattle sectors using different means and relevant media platforms (e.g. farmer's days, radio talks, pamphlets, etc.). Awareness and education efforts need to be consistently conducted to empower cattle farmers and keepers to prevent and control the disease in their animals, as well as to safeguard themselves from zoonotic disease.
- Medical professionals need to consistently be made aware of the zoonotic potential of brucellosis, especially in affected areas. Abattoir personnel need to be trained how to safely slaughter infected cattle.

- Education and awareness efforts need to be well documented and coordinated for maximum efficacy (e.g. coupled to activities such as cattle vaccination and sampling for testing). Awareness and education campaigns should be continuously and repeatedly conducted as this is pivotal to the ongoing effort to control brucellosis as a threat to animal and human health. The timeframe education and awareness campaigns will be ongoing.

(iii) Compulsory testing

- Develop and implement a compulsory national bovine brucellosis testing strategy to determine disease prevalence and detect positive herds. Stepwise implementation of compulsory testing is suggested. Testing should be prioritised and be ongoing for infected herds, their neighbouring herds, high risk areas/ herds and suspect herds. The number of cattle tested across different production systems has to be well documented and reported.
- Testing should be legislated as compulsory for all cattle herds and should be implemented in a collaborative effort to control the disease in all cattle farming sectors. Industry initiatives e.g. herd declaration or "proof of herd testing" requirements for sale and slaughter should be supported and gradually strengthened. Critical control points for assessing "proof of herd testing" could include: Auctions, shows, registered livestock agents, breed societies, dedicated feedlots, abattoirs, etc.
- Herds that test positive have to be quarantined, positive cattle C-branded and slaughter of positive cattle instituted in an attempt to eradicate the disease from the herd and to lift quarantine.
- Manager or owner of land or an owner of animals is responsible to inform buyers and neighbours if brucellosis is present in their herd (Section 11 of the Act and Regulation 12 [3]).
- Address laboratory quality (international standard based) and capacity, as this is an important factor that needs to be supported in order to increase and maintain testing efforts. Ideally, every province should have laboratory capacity to test for brucellosis.
- Address the availability of cost-effective test antigens for brucellosis (ideally locally produced). Coupled with this is to address procurement procedures to ensure effectiveness and efficiency.

(iv) Movement control

- Amend the current Bovine Brucellosis Scheme to prohibit and prevent any infected AND susceptible animals from being moved from a brucellosis-quarantined farm or area.
- Develop and implement a movement control strategy to prevent movement of untested cattle and cattle from positive herds. This will require a legislative amendment. Movement control will be greatly aided by an individual identification and traceability system. As a start, movement control can be implemented through

vendor declarations at identified critical control points (auctions, shows, registered livestock agents, breed societies, dedicated feedlots, abattoirs, etc.).
- Individual fenced holdings versus communal grazing areas should be approached accordingly to ensure that the epidemiological unit of cattle is managed correctly.

(v) Slaughter of positive cattle

- Develop and implement a strategy that will provide guidelines on how to approach brucellosis positive herds based on biosecurity, intra-herd prevalence, owner cooperation, risk of disease spread to other farms, etc. Provincial State Veterinarians will still have to use their professional discretion to optimise disease control within the provided guidelines.
- Encourage industry bodies and/ or develop public-private-partnerships for incentivising the rapid slaughter of infected animals to actively promote the eradication of brucellosis from infected herds/ farms/ areas. The type of incentive required needs to be considered and established for different production systems. The timeframe to institute large scale slaughter incentives across all production levels is envisaged to take 20-25 years, depending on cooperation of the different sectors and continuous availability of resources.
- Develop and implement a standard protocol for the slaughter of brucellosis positive cattle and high risk cattle (female cattle over 18 months of an unknown brucellosis status) to ensure that abattoirs are able to slaughter such animals safely. Additional costs incurred should be estimated and addressed accordingly. The occupational health and safety of abattoir workers needs to be prioritised in partnership with Department of Health.
- Dedicated feedlots need to be established that can receive cattle from infected herds to fatten them up before slaughter if required – full traceability, as well as compulsory C-branding and potential registration of such feedlots will be a requirement.

(vi) Reporting

- Development and effective implementation of a central brucellosis database containing all relevant variables to monitor and evaluate necessary trends. The current national disease reporting system should be utilised and enhanced to cater specifically for improved brucellosis reporting in a separate database. This would require all provinces reporting using the same database format.
- Disease reporting training will have to be conducted on an ongoing basis to ensure correct data capture. Active follow up may be required to obtain data at a central provincial level and also at national level.
- Cattle census data is required in all SV areas – This should be obtained through conventional livestock census and eventually through countrywide LITS roll-out.

(vii) Effective implementation of control measures

- Implementation of the current legislation and proposed policy revisions needs to be addressed through the development of comprehensive implementation plans for set objectives and goals, which will include budget determinations and socio-economic impact assessments. Implementation plans need to be fair, equitable and sustainable for all cattle production systems. Support and buy-in of all relevant stakeholders is critical for the policy to progress and succeed.
- As set out in the Veterinary Strategy (2016-2026), the Veterinary Services chain of command structure needs to be addressed accordingly to enable a comprehensive and standardised approach to disease control policy implementation. Roles and responsibilities should be clearly laid out.
- Filling of vacant State Veterinarian, Animal Health Technician and Laboratory Technologist posts.
- Authorisation of private veterinarians and Animal Health Technicians (supervised by a registered veterinarian) need to be instituted to increase capacity for sampling for testing and disease control efforts and this needs to be well documented and controlled.
- Cattle owner responsibilities need to be made clear and critical control points (e.g. at auctions, shows, feedlots and abattoirs) need to be established to ensure improved adherence to the revised policy.

Option 3: Develop and implement a national bovine brucellosis eradication strategy

This policy option aims for national eradication of the disease from the entire cattle population in the country. It would follow the same steps contained in policy option 2, with additional widespread and regularly enforced testing and rapid forced slaughter of all positive and suspect cattle. At this point of rapid enforced slaughter, compensation will have to be considered. This can only be realistically attempted once the prevalence falls to at least <2% total cattle prevalence and once wildlife infection can be addressed as well (livestock-wildlife interface control). This option is not currently feasible, but may be considered once policy option 2 has been shown to be successfully implemented.

7. LINKAGE TO OTHER POLICIES

This policy will lead to the drafting of legislation amendments which will be published as a regulation change, and the development of more detailed implementation plans for the recommended policy option's objectives and goals. The policy will be applied and implemented nationally through the Veterinary Services of the nine provinces. Private veterinarians and AHT's may be authorised to assist with sampling for testing and other control measures to increase manpower capacity.

The revised brucellosis control policy in cattle is an important objective of the Veterinary Strategy (2016-2026): Brucellosis has been selected as a "model disease" for the development

of a revised disease control policy, which will be used as the framework for future disease control efforts.

This policy has the added benefit of increasing overall access of cattle farmers and cattle keepers to Veterinary Services – This will add to the initiatives of Primary Animal Health Care and Compulsory Community Services of veterinarians that aims to increase access of rural communities to Veterinary Services.

The bovine brucellosis policy will support the LITS policy (in development) as animal identification and traceability is a key component of brucellosis control. It is also ideal to run the bovine brucellosis policy in parallel with the LITS policy as both policies can be applied at the same time on a farm via pilot projects, e.g. tagging of heifers when vaccinating for brucellosis or tagging of the whole herd when sampling for testing of brucellosis status.

This policy should be linked to other public health policies regarding zoonotic diseases. The National One Health Forum should make brucellosis a key area for corroboration between the various stakeholders. Policies on brucellosis, amongst other neglected re-emerging zoonosis, should be put in place by this forum.

8. IMPLEMENTATION PLAN:

General Overview:

A broad overview and approach has been provided in "policy option 2" above. Commitment to the achievement of the policy objectives is required from all stakeholders. Implementation plans for the policy objectives will be broken down into specific goals (short, medium, long term and continuous) which will be fully described and consulted before they are implemented. This will include budget determinations and socio-economic impact assessments as required.

The achievement of these goals will be partially dependent on the availability of human and financial resources. It is only realistic to implement the policy as a multipronged stepwise approach with regular re-evaluation of the goals achieved on a yearly basis by the Bovine Brucellosis Working Group, Brucellosis Steering Committee and the MinTech-VWG. As certain goals are achieved the focus can be shifted to achieving subsequent goals.

9. COMMUNICATION PLAN

Communication is already in progress and public consultation has already been initiated through the publication of the "Discussion Paper on the Review of Bovine Brucellosis Control in South Africa" in the Government Gazette No. 40827 of 5 May 2017, as well as the "Draft document - Bovine Brucellosis Control Policy, South Africa" in the Government Gazette No. 42839, Vol. 653 of 15 November 2019.

Technical Working Group and Steering Committee

The Bovine Brucellosis Working Group (BRWG) was established in December 2013 and reports to MinTech Veterinary Working Group.

The Brucellosis Steering Committee (BSC) was established in July 2016 between NAHF and government as a combined initiative to start creating brucellosis awareness across all platforms.

Stakeholder engagement

- Through the BRWG and BSC as mentioned above.
- Through the NAHF and the Provincial Animal Health Forums.
- The National One Health Forum.
- Communal farmers should be reached through existing Committee's/ structures and also through Veterinary Services (and Extension Services).
- A Champion with relevant experience and expertise should be identified in each Province to drive Brucellosis communication. It should be emphasised that every farm visit for brucellosis vaccination and sampling for testing has to be used as an opportunity for education as well, to maximise the impact of each farm/community visit.

Internally within government

The finalised policy document will be communicated with MinTech and all relevant stakeholders after approval by the Chief Director: Animal Health and Production.. The document will also be communicated with the DALRRD Directorate: Organisation Performance and Directorate: Policy Research Support, as well as the Socio-economic Impact Assessment Unit of The Presidency.

External

The finalised policy will be published in the Government Gazette. Once published, the notice will be distributed to all relevant stakeholders to ensure that a wide audience is reached. Target audience – Veterinarians and para-veterinarians, the general public (consumers of dairy products), all cattle farmers (of all levels/ sectors), livestock industry and all associated stakeholders. Health professionals at all levels should also be included as brucellosis is a zoonotic disease. The policy will also be published on the DALRRD website.

DALRRD, Provincial and other national structures personnel, police, private veterinarians, students other contracted service providers, cattle keepers and others industry stakeholders should receive adequate training/ education to ensure the policy is implemented effectively and efficiently and to avoid creating misunderstanding among the participants. The training/ education relates to an overall understanding of bovine brucellosis as a disease in cattle and the control measures required to prevent the spread of infection.

National and central provincial coordination of the brucellosis control policy is pivotal to its success.

Development of future implementation plans

Detailed implementation plans to address the goals listed under the objectives of the policy will be developed. Budget determinations will be developed in consultation with relevant stakeholders. The DALRRD Directorate: Policy Research Support, as well as the Socio-economic Impact Assessment Unit of The Presidency will be consulted regarding socio-economic impact assessment requirements for the implementation plans. Monitoring and Evaluation criteria will be developed in consultation with relevant stakeholders. Detailed communication plans will be established for each of the implementation plans that will address all goals listed under the relevant objectives as mentioned above.

10. MONITORING AND EVALUATION

More details on indicators, target results and timeframes, timing and frequency of reporting, units, level, classification, source, and responsible parties for reporting will be provided in the fully detailed implementation plans, which will also go through budget determinations, socio-economic impact assessments and public consultation processes before being published in the Government Gazette. Deliverables will be defined and monitoring and evaluation will be done through the customary Provincial and National pathways.

11. REFERENCE DOCUMENTS

- Bovine Brucellosis Scheme R.2483 of 9 Dec 1988
- Table 2 of the Animal Diseases Regulations (R.2026 of 1986)
- Manual for brucellosis in cattle (September 2016) (https://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/dahpolicy)
- Discussion Paper on the Review of Bovine Brucellosis Control in South Africa (Government Gazette No. 40827 of 5 May 2017) (https://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/dahpolicy)
- Draft document - Bovine Brucellosis Control Policy, South Africa (Government Gazette No. 42839, Vol. 653 of 15 November 2019) (http://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/dahpolicy)
- South African Veterinary Strategy (2016-2026) (https://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/press-release)
- The OIE Terrestrial Animal Health Code chapter 8.4 "Infection with *Brucella abortus, B. melitensis* and *B. suis*"

- The OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2018 chapter 2.1.4. "Brucellosis (*Brucella abortus, B. melitensis* and *B. suis*) (infection with *B. abortus, B. melitensis* and *B. suis*)"
- The control of neglected zoonotic diseases - A route to poverty alleviation: report of a joint WHO/DFID-AHP meeting, 20 and 21 September 2005, WHO Headquarters, Geneva, with the participation of FAO and OIE
- Robinson, A. and Production, A., 2003. Guidelines for coordinated human and animal brucellosis surveillance. Animal Production and Health Paper 156. Food and Agriculture Organization, Rome: FAO."
- Idrissi, A., 2014. FAO works to curb the burden of brucellosis in endemic countries: Case studies from Eurasia and the Near East. FAO focus on, (8).

12. POLICY OWNER/COORDINATOR

DALRRD, Directorate: Animal Health

13. DOCUMENT INFORMATION

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14. APPENDICES

- Government Gazette No. 40827 of 5 May 2017
- Discussion Paper on the Review of Bovine Brucellosis Control in South Africa (https://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/dahpolicy)
- Government Gazette No. 42839 of 15 November 2019
- Draft document - Bovine Brucellosis Control Policy, South Africa (http://www.daff.gov.za/daffweb3/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/dahpolicy)