LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

LIVESTOCK RESEARCH AND INNOVATION STRATEGY




FOREWORD

The Livestock Research and Innovation Strategy outline initiatives to support the livestock industry in the Limpopo Province and accelerate universal access and participation to the industry. It provides guidance for achieving synergies with other key departmental programmes as well as research and training institutions. The broader goal is to leverage the knowledge base in the department and elsewhere to achieve the object of land reform, agricultural and rural development, economic empowerment and human capacity development.

The strategy takes cognisance of the fact that Limpopo is prone to drought with severe negative impact on farmers businesses. Furthermore, high input cost continues to reduce our competitiveness and remain an important obstacle to the growth of our livestock sector. On the other hand, majority of our farmers experience enormous challenges when competing in the market.

The strategy has identified key focus areas of breeding to utilise our indigenous livestock genetic resources. In this regard, we shall encourage our farmers to keep hardy animals that will survive harsh climatic conditions at low input costs. Conservation programs with our indigenous livestock will also create a platform for novel molecular genetics research. In addition, the department will engage in research on alternative feeding, drought mitigation technologies, and enhance its research capacity in aquaculture to sustain poverty eradication and food security interventions. The department will focus on post harvest and value adding research as well as integration of indigenous knowledge systems to enable grassroots innovation. The indigenous knowledge research will also facilitate the downscaling of large-scale technologies to appropriate use by rural communities.

This strategy was not developed in isolation; we will strive to engage our stakeholders to realise our vision for "*a united and prosperous agricultural sector*".

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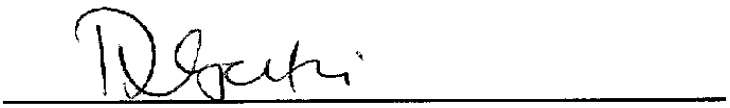

Mme Dipuo Letsatsi-Duba
MEC – Limpopo Department of Agriculture

PREAMBLE

The strategy positions research and innovation interventions as an integral part of actions towards the achievement of government objectives of economic growth, job creation, economic empowerment, poverty alleviation and regional integration. The strategy is cognisant of the key departmental focus programmes for the five year MTEF period and the key approaches for service delivery as well key action programmes of the Limpopo Employment Growth and Development Plan (LEGDP).

In the context of the agriculture sector strategy, there are two factors to consider when developing an appropriate livestock research and innovation strategy. First, there is need to respond to issues of global change such as climate change and trade by generating new knowledge and technology through research, to improve competitiveness of the livestock sector. Second, there is need to increase the uptake of available technologies through adaptation and innovation, to bridge the gap within a dualistic livestock sector. It is for this reason that the strategy advocates the growth of emerging farmers and rural communities at local municipality level as well as strengthening competitiveness of the commercial sector. Imperative is that the strategy will support other key departmental programmes such as the Land and Agrarian Reform Programme (LARP) and Agriculture Black Economic Empowerment (AgriBEE).

This strategy has an implementation plan, which is aligned with the departmental performance management system. In addition, the strategy has monitoring and evaluation plan to enable stakeholder participation and peer evaluation.

The effective implementation of this strategy will depend entirely on effective communication, collaboration and cooperation with all relevant stakeholders as well as budget allocation in accordance with priorities of the department.

Prof A E Nesamvuni
HOD – Limpopo Department of Agriculture

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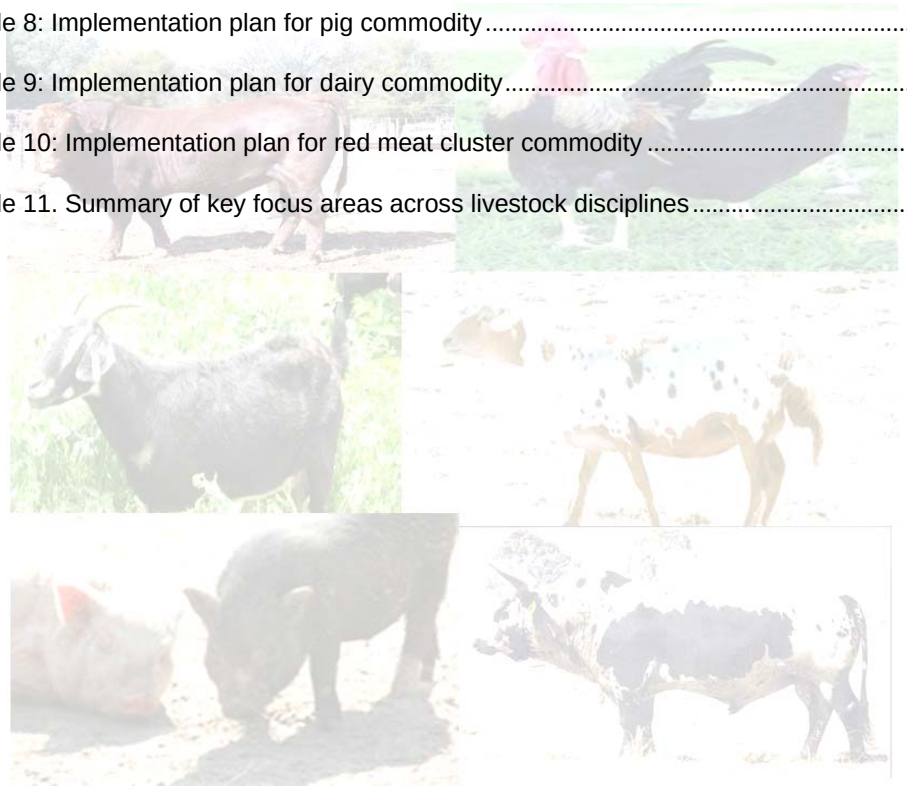


1. INTRODUCTION

1.1 PURPOSE

The Livestock Research and Innovation division falls under the sub-branch Technical Research Services of the Limpopo Department of Agriculture (LDA). The overall objective is to render agricultural research service and development of information systems with regard to agricultural and natural resource utilization technologies.

The purpose of the Livestock Research and Innovation Strategy is to:

- Guide the LDA in the formation and implementation of livestock research and innovation programmes.
- Provide a framework for developing livestock research capacity and expertise, focusing efforts to LDA strategic priorities and areas of competitive advantage; and ensuring effective technology transfer and communication with the entire farming community.
- Provide a framework for knowledge generation and information sharing; and to enhance participation of all relevant stakeholders.
- Mobilise resources and enhance their effective use for sustainable livestock research, innovation and development.

1.2 POLICY AND LEGISLATIVE FRAMEWORK

Livestock Research and Innovation is operated within the context of the National System of Innovation, the Agricultural Sector, Land Reform and Rural Development, Livestock industry, as well as Sustainable Management of Natural Resources. Therefore, this strategy is guided by various legislative frameworks at national and international agriculture, health and environment (Annexure A).

1.3 SITUATIONAL ANALYSIS OF THE LIVESTOCK INDUSTRY

Limpopo, being amongst the most rural provinces of the country, agriculture plays an important role in its economic development. Agriculture is an important employer in the province accounting for 17.5% of formal employment and 25% of informal employment. Contrary to national statistics showing that livestock contributes 55% to gross farming income, livestock contributes less than 40% to gross farming income in the province (Statistics South Africa, 2007). This apparent lack of competitiveness of

the livestock sector is mainly skewed by industries such as poultry and dairy where the province ranks low in terms of size. However, Limpopo has the largest game and pig industries. This state of affairs poses a challenge for research and innovation interventions to grow lagging industries to potential as well as improve the performance of competitive ones.

Of importance is the need to conduct value chain analysis with a view to address poverty, food security as well as competitiveness of each livestock commodity. In this regard, research and innovation in aquaculture, small scale poultry and small scale dairy could provide immediate solutions to priority needs of poverty and food security. However, in the long term, all interventions should focus on improved access and participation as well as increased competitiveness.

1.3.1 STAKEHOLDER IDENTIFICATION

The livestock research and innovation strategy values the partnerships and collaborations with various stakeholders. In general, the stakeholders include livestock farmers, commodity organisations, breed societies, farmers' organisations, internal stakeholders, institutions of higher learning, research institutions, non-government organisations (NGO's), local authorities, livestock processors, livestock traders as well as other government departments. The department will respond to the needs of stakeholders and create mechanisms for strengthening partnerships to affirm the departmental philosophy "*nothing about us, without us*".

1.3.2 SWOT ANALYSIS

The internal and external environmental factors (strengths, weaknesses, opportunities and threats) which may impact on livestock research and innovation in the province are listed below. However, detailed analysis of each commodity is presented in the subsequent sections showing how the department would leverage on its strengths and pursue opportunities as well as how weaknesses would be turned into strengths and threats turned into opportunities.

STRENGTHS

- Existence of the LEGDP as well as departmental initiatives to grow the livestock industry and support rural development.
- Existing service delivery approaches that ensure participatory and need-driven interventions to make an impact on local economic growth.

- Availability of research infrastructure at training institutions, agricultural development centres, and departmental farms.
- Most of the land in the province is suitable for livestock farming
- Limpopo is endowed with wealth of adapted indigenous livestock breeds.
- Existing networks and collaborations with the national and international partners.

WEAKNESSES

- Limited research human capacity.
- Uncoordinated research agenda and priorities.
- Limited resources (land, water, capital, etc) by communal and emerging farming sectors.
- Low participation to mainstream economy by communal and emerging farming sectors.

THREATS

- Harsh climatic conditions, droughts, stock theft, predators as well as transmittable animal diseases increase risks of livestock business.
- Globalisation and fluctuating commodity prices.
- Degradation of natural resources due to overstocking.
- Erosion of indigenous livestock genetic resources.
- Loss of research infrastructure at agricultural development centres and farms due to land claims.

OPPORTUNITIES

- Development of models for coordinating livestock research agenda and priorities
- Strengthening livestock research and training capacity e.g., postgraduate studies aligned with departmental projects to facilitate application

- Identification and development of livestock research and innovation focus areas to mitigate climate change, e.g., drought mitigation, alternative feeding, adaptability of livestock resources and optimisation of water use
- Development of new focus areas based on provincial initiatives such as bio-diesel incubator and sorghum projects e.g., alternative feeding
- Integration with land reform programs provides opportunity for impact of livestock research and innovation interventions responsive to socio-economic and environmental challenges
- Development of alternative and integrated livestock production systems
- Development of conservation programs and sustainable utilisation of indigenous livestock genetic resources
- Exploitation of molecular genetics technologies utilising indigenous livestock genetic resources

2. COMMODITIES

2.1 AQUACULTURE

2.1.1 COMMODITY OVERVIEW

Aquaculture, also known as aqua-farming, is the cultivation of aquatic population, including both animals and plants under controlled conditions under either freshwater or saltwater. From the animal perspective, aquaculture involves a variety of species such as fish, shrimps, oysters, crabs and crocodiles. Another form of aquaculture known as aquaponics involves the integration of both fish and plant farming.

Aquaculture, particularly the farming of fish and other molluscs and crustaceans have important implications for economic growth. To date, aquaculture accounts for 32% of the world production of fisheries with an average growth rate of 8%. With projected decline of capture fish to below current per capita consumption, aquaculture could be an important alternative to the harvesting of wild fish stocks as well as an effective source of animal protein. Thus, strategically aquaculture provides both environmental and economic benefits. The cultivation of fish under modern technology releases pressure on the natural resources. However, aquaculture in general calls for the monitoring for environmental impact.

Meanwhile, there is ample evidence of the use of aquaculture as an effective intervention to create jobs, increase food security and reduce poverty with most citations from China and India. It is on the basis of the latter that aquaculture is spreading as small enterprises in developing countries. In South Africa, aquaculture forms part of the national priorities to intervene in poverty reduction. This is true for Limpopo where aquaculture also features as one of the key intervention strategies to achieve provincial growth and development. Through various sectors including the provincial department of agriculture and municipalities, the Limpopo government has implemented freshwater aquaculture to achieve social impacts.

2.1.2 COMPETITIVE ADVANTAGE

From a natural resource perspective, Limpopo is characterized by sub-tropical temperatures with erratic rainfall patterns but has a great potential for the development of warm-water aquaculture ventures. According to Statistics South Africa (2007) the province can be classified as less competitive in aquaculture. Accordingly, most projects in the province grow tilapia, which is the most adapted species for its climatic conditions. To derive its dynamic competitiveness, Limpopo should develop mechanisms for addressing its constraints as discussed below.

2.1.3 VALUE CHAIN ANALYSIS

The Limpopo Department of Agriculture has established fish breeding centres while the University of Limpopo (UNL) and University of Venda (UNIVEN) undertake research in various aspects of aquaculture. In order to build capacity in research by aligning postgraduate studies with departmental projects, a coordinated approach is necessary to develop a common vision for aquaculture between the department and aquaculture research at UNL and UNIVEN. This alignment could facilitate the

identification of priority projects. In a short to medium term, priority areas should include studies to determine the adaptability of different fish strains to a wide range of climatic conditions in the province. Such studies could establish the potential for certain locations in the province to produce fingerlings, which is a critical component of the growth of the aquaculture industry.

Other research areas for aquaculture include fish health, feeding and environmental impact. The three are interrelated with a huge potential impact on human health. These research areas form the basis for the development of economic models for aquaculture enterprises. It is important to emphasise that as in the case of intensive livestock enterprises, feed is also an important cost driver for aquaculture, which necessitates the introduction of alternative feed sources. Alternative feed sources can act as host for pathogens with potential zoonotic effects. As a new production area in Limpopo, aquaculture could necessitate the orientation of current veterinarian and animal health technicians to common fish diseases in support of the aquaculture industry. Simultaneously, safe production of feeds for aquaculture should also be addressed. From an environmental perspective, waste management will also become an important research area with innovation needed to provide technological solutions for the treatment and handling of waste water and products from aquaculture.

From a market development perspective, aquaculture market is still less developed posing high risks for the production of raw fish. Post harvest innovations will be needed for the preservation of fish with a view to generating new knowledge on processing of fish under communal production conditions. Both interventions can utilize the vast stock of indigenous knowledge vesting in the province and the country. This will call for broad thinking outside the box for all involved in research and innovation to develop mechanisms for integrating existing local knowledge to enhance the aquaculture industry.

Another important integration for aquaculture is the expansion of understanding by animal scientists about the application of water resource management to aquaculture. Limpopo has several irrigation schemes, whose rehabilitation has been prioritized by both the national and provincial governments. As part of developing economic models, the livestock research and innovation strategy should create mechanisms for the effective use of irrigation schemes to support the aquaculture industry. Table 1 summarises the constraints and mechanisms to overcome them.

Table 1: Analysis of constraints for aquaculture and mechanisms to overcome them

Constraints	Strategic interventions
Absence of aquaculture research and innovation focus area	Introduce aquaculture as research and innovation focus
Poor alignment of postgraduate training with departmental projects	Align postgraduate training with departmental projects
Scarce water resources and poor infrastructure	Align research with existing dams and irrigation schemes to increase impact
High feed costs	Development of alternative feeds to reduce production costs
Limited information on aquaculture by the farming sector	Transfer technology and information on aquaculture
Limited capacity for aquaculture research	Recruitment of aquaculture specialists
Lack of post harvest innovation and markets for aquaculture	Develop post harvest innovation and improve market access

2.1.4 KEY FOCUS AREAS

The strategic importance of aquaculture in eradicating poverty and its potential to impact on economic growth warrants for research support. The focus area will utilize existing infrastructure at departmental facilities as well as institutions of higher learning within the province. The emphasis will be on extended capacity building efforts for livestock researchers. The immediate activities will be on technologies for achieving viable aquaculture enterprise. In this regard, research will focus on breeding, feeding and post harvest innovations. Other research areas such as waste management will be implemented over a long term.

2.2. POULTRY

2.2.1 COMMODITY OVERVIEW

The importance of the poultry industry in South Africa cannot be overemphasised. The poultry industry has been the fastest growing livestock industry in South Africa reaching 245% and 397% respective growth for eggs and meat production between 1972 and 2002, compared to an average growth of between 80 and 96% for other livestock industries. The gross value of poultry meat and eggs accounts for 40% of all livestock products and 17% of agricultural gross domestic product (GDP) and both product groups consume 30 and 45% of maize and formulated feeds, respectively. From a food security and nutrition perspective, poultry products contribute 57% of animal protein consumed in South Africa. In addition, the industry contributes 10% to employment from agriculture with the broiler business accounting for most, 78%. Commercial broiler producers account for 80% of the local annual poultry meat production with the remaining supply coming from culls, small scale producers, geese, ducks and turkey. Ten percent of poultry meat is imported, mainly from Brazil.

To date the industry has 404 commercial broiler producers and 267 commercial egg producers and 1554 government supported small scale producers. However, the structure of the industry is dominated by two large producers who collectively account for 55% of broiler production (USDA, Foreign Agricultural Services, 2007). This skewed participation is also observed with the national flock ownership pattern where only 32% of the 62 million birds are in the hands of communal and informal sector. The current research and innovation strategy should strive to achieve broiler import replacement through interventions that increase universal access of communal and informal producers.

The poultry industry structure is also skewed with regard to egg production. Although independent producers account for 50% of the total output, the industry is dominated by four main producers who collectively account for the other 50% of production. However, the large proportion of small independent producers suggests easy entry to the egg industry. In view of previous food security interventions by Limpopo Department of Agriculture, such as the supply of a batch of layers to needy families, the easy entry to the egg industry provides an opportunity for innovation such as models and packages for achieving universal access to the industry. These could address issues such as the ideal size of packages, feeding and disease control.

2.2.2 COMPETITIVE ADVANTAGE

Limpopo is one of the smallest poultry production areas ranking 8th above Northern Cape (National Livestock Strategy, 2004). This seems to be related to the location of major poultry operations most of which are outside Limpopo. The notion that poultry production seems to be concentrated in maize producing areas seems not to hold with statistics for commercial agriculture showing that the main maize producing province, Free State ranks sixth in poultry production. This implies ample opportunities for research and innovation in alternative feeding. Although it is not a major producer of maize, Limpopo produces significant amounts of sorghum, which can effectively substitute for maize. There is ample evidence on the potential use of sorghum in chicken feed. An important development in this regard is the rehabilitation of irrigation schemes and the implementation of biodiesel project, which will enable the production of multiple crops including various protein-rich cereals such as soybean and sunflower. This new production system will broaden the feed options for pigs and poultry and offer opportunities for feed formulation on amino acid profile rather than crude protein basis. There is ample evidence from alternative feeding studies conducted on pigs, which can be applied to poultry production.

Another important area of opportunities is innovation related to indigenous chickens. Indigenous chickens play an important role in rural livelihoods because of their adaptability and efficiency, which enable low input production systems. In this regard, innovation should focus on breeding and genetics to improve local production systems. A related area is the control of poultry diseases, which needs innovation to achieve the coexistence of multiple production systems taking into the account both the resistance of indigenous chickens and the need for strict disease control for commercial broiler and egg operations.

In the case of egg production, Limpopo rank sixth in the country (SAPPA, 2007). Similar dynamics noted for broiler production seem to be at play with egg production and offer research and innovation opportunities along the total value chain. It must be emphasized that the sustainability of small scale egg producers offer ample opportunities for the exploration of different models for facilitating universal access from pullet production to quality management issues.

From a livelihoods perspective, poultry production forms an important part of rural livelihoods in Limpopo. The province has 346 small scale broiler producers 24 of whom are contract growers linked to commercial producers. In terms of production

capacity, contract growers' account for the same output as all small scale producers combined. This has serious implications for the current research and innovation strategy to focus on intervention for improving small scale production systems including contract growers.

2.2.3 VALUE CHAIN ANALYSIS

Feed is the main economic driver in the poultry industry accounting for approximately 75% of the costs. With the poultry industry dependent on maize based diets, maize price is very crucial for the industry. Research and innovation on feed and nutrition have a high potential to improve the competitiveness of poultry industry in Limpopo. Another important focus area is chicken abattoirs. There are 372 abattoirs nationwide comprising 41 high throughputs, 190 low throughputs, 14 rural and 127 uncategorised. Abattoirs linked to small scale poultry units offer research opportunities to introduce innovation for improving management efficiency and product quality improvement. Table 2 summarises the constraints and mechanisms to overcome them.

Table 2: Analysis of constraints for poultry and mechanisms to overcome them

Constraints	**Strategic intervention**
High input costs	Develop cost reduction innovation including alternative feeding
Poor alignment of postgraduate training with departmental projects	Align postgraduate training with departmental projects
Limited focus on indigenous chickens	Establish research studies on indigenous chickens and low input systems
Limited access to the industry by new entrants	Support other departmental initiatives to increase access in various municipalities
Lack of appropriate post harvest technologies	Evaluate downscaled post harvest technologies
Limited knowledge on waste management	Initiate waste management research
Disease outbreaks	Develop innovation for traceability and disease control
Limited research infrastructure	Establish research infrastructure

2.2.4 KEY FOCUS AREAS

The strategy will adopt a two pronged approach to promote the conservation and utilisation of indigenous chickens, to improve food security, and address key priority areas for commercial broiler and layer industry to improve competitiveness and universal access. Breeding research will be prioritised for indigenous chickens while broiler and layer research will focus on alternative feeding and other technologies for cost reduction. However, post harvest research will be conducted in all types of chickens to improve universal access to the value chain.

2.3 PIGS

2.3.1 COMMODITY OVERVIEW

Although not at the same scale as poultry, pig production is an important part of livelihoods in South Africa. The industry consists of 350 commercial producers, 22 stud breeders and 4 000 emerging producers who collectively own 103 000 sows and 7 000 boars. It is one of the smallest livestock industries with annual consumption of 160 000 ton accounting for only 4% of the gross value of all livestock products and 6.5% of all meat products. Limpopo is an important pig producing province ranking 4th with 11% of the total commercial sow herd (SAPPO, 2009).

2.3.2 INDUSTRY COMPETITIVENESS

On a global scale South Africa is a small producer of pork, contributing less than 1% to global output and importing 7% of its domestic needs. This suggests the low competitiveness of the South African pig industry even though compounded by extraneous factors such as subsidies from competitors. However, the high import volumes provide an opportunity for expansion within the industry with a view to achieving import replacements. From a research and innovation point of view,

production systems of the pig industry should be thoroughly studied to identify areas for improvement. For instance, the decline in the number of stud breeders from 36 in 2003 to 22 in 2008 suggests significant morphology of production systems in favour of commercial production. This could pose a serious threat for the sustainability of gene pool.

2.3.3 VALUE CHAIN ANALYSIS

The distribution of pigs indicates that of the 112 pig producers in Limpopo, only 12% are commercial operations with emerging farmers comprising over 85% of all establishments. Despite these statistics, it is important to note that the South African pig industry is mainly intensive hence new efforts should be geared towards increasing universal access to this type of system. In this context, genetic improvement should be a priority among emerging producers to improve universal access to the pig industry. This could include the conservation of indigenous pigs focusing on traits related to adaptability. Other opportunities for research and innovation are cost reduction activities such as alternative feeding, food safety studies including aspects such as the use of alternative products to antibiotics, disease control as well as slaughtering. Table 3 summarises the constraints and mechanisms to overcome them.

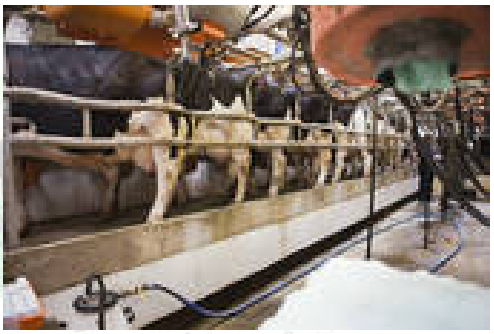
Table 3: Analysis of constraints for pigs and mechanisms to overcome them

Constraints	**Strategic interventions**
Small number of seed-stock producers	Initiate breeding and genetic studies to utilize adapted genotypes to grow the industry
Poor alignment of postgraduate training with departmental projects	Align postgraduate training with departmental projects
High production costs	Develop innovation around alternative feeding and reduced cost of production
Disease outbreaks	Develop innovation for traceability and disease control Research utilising indigenous adapted pigs
Limited access to post harvest facilities	Develop innovation to improve product quality
Limited knowledge on waste management	Initiate waste management research
Limited research infrastructure	Establish research infrastructure

2.3.4 KEY FOCUS AREAS

The growth of the pig industry could be restricted by the availability of seed-stock. Therefore breeding research will be prioritised to address this constraint. Another important priority area is alternative feeding, which will be addressed in the context of utilising opportunities emanating from new crop production systems that respond to climate change, irrigation schemes and bio-fuel production. The research will focus primarily on indigenous pigs that are adapted to the local prevailing conditions.

2.4. DAIRY INDUSTRY



2.4.1 COMMODITY OVERVIEW

The dairy industry is one of the intensive production systems facing similar challenges regarding input costs as pigs and poultry. Milk production occurs in all regions of South Africa with most output produced from coastal areas on good quality natural and artificial pastures. Although South Africa contributes only 0.5% of world milk production, dairy is the fifth largest agricultural industry in the country. The industry has 4 000 producers employing 60 000 workers directly and 40 000 indirectly. However, South Africa is a net importer of processed dairy, 24 000 tons.

2.4.2 INDUSTRY COMPETITIVENESS

Limpopo is the lowest producer of milk, compared to all the other provinces in South Africa. It has a total of 38 large-scale commercial dairy producers and accounts for only 0.5% of the national milk output. All districts in Limpopo have a density of less than 10 producers per district, the lowest in the country. Cow density is also the lowest in the country (less than 0.2 cows per square kilometre). Commercial dairy herds in Limpopo are fairly large (206 cows) compared to the national average of 151 cows. The province has a high potential for dairy production, as indicated by the fact that it has the highest average milk yield per cow (19.21 litres per cow per day). The

national average milk yield per cow is 15.20 litres per day. The dairy sector in Limpopo is therefore more efficient and can be regarded as competitive.

The competitiveness of the dairy industry is restricted by two main factors i.e., producer price and feed cost. For example, producer prices for milk (the amount of money the primary producer or farmer is paid for milk) increased from just under R 1 per litre in 1996 to just under R 2 per litre in 2006 while the consumer price for milk has increased from just over R 3 per litre to almost R 5.50 per litre during the same period. One of the ways for farmers to remain financially viable in spite of the poor prices they receive for milk sold and increasing production costs is to increase milk production. This can be done either by increasing production per cow, increasing the number of cows and/or the application of value adding technologies. As a result, there has been a major shift from smaller dairy operations to undertakings where daily milk production exceeds 3 000 litres.

2.4.3 VALUE CHAIN ANALYSIS

The dairy industry has multiple production systems based on cattle and goats, and intensive and semi intensive systems known as dairy ranching. The latter has potential for intervention in low input systems where dual purpose breeds and goat milk production traits could be enhanced to promote integrated beef and dairy production for optimal economics. Previous interventions have been made to use dairy as a poverty reduction tool where pass a gift approach was used for poor families to use high producing cows over time before passing progeny to the next needy member of the community. Management requirements for such production systems need to be enhanced. An important aspect of innovation in dairy is the introduction of assisted reproduction technologies such as artificial insemination among emerging farmers to improve the performance of their dairy enterprises. Packaging of these technologies is a subject for innovation.

Another important focus area is the potential to integrate indigenous technologies for the development of dairy products. This focus area can make a high impact on poverty if targeted at designated groups such as women. This intervention can be used to support initiatives such as school feeding schemes and other poverty eradication initiatives. Table 1 summarises the constraints and mechanisms to overcome them.

Table 4: Analysis of constraints for dairy and mechanisms to overcome them

Constraints	Strategic intervention
Limited access because of highly intensive systems and high input costs	Innovation to improve dairy ranching
Poor alignment of postgraduate training with departmental projects	Align postgraduate training with departmental projects
Lack of post harvest innovation for small scale dairy production systems	Develop post harvest innovation including the application of indigenous knowledge
Inadaptability of traditional dairy genotypes	Utilize adapted dual purpose breeds for milk production
Limited knowledge on waste management	Develop innovation about waste management

2.4.4 KEY FOCUS AREAS

Dairy research offers ample opportunities for impact on quality of life. In the short term, post harvest technologies including indigenous knowledge systems will be prioritised to support product development. Another priority will be dairy ranching to achieve both universal access and improve efficiency among emerging farmers. Since the traditional dairy breeds are not adapted to the harsh climatic conditions of the province, adapted indigenous livestock breeds will be utilized in dual purpose systems. In the medium term, research will focus on alternative feeding and breeding technologies.

2.5 RED MEAT

2.5.1 COMMODITY OVERVIEW

The red meat cluster has been identified as a strategic mechanism for economic development in Limpopo. From a natural resource perspective, the cluster including beef, sheep and goats have serious environmental impact, utilizing 53% of the grassland in the country. Another part of the red meat cluster is game, which utilizes 12% of the land. Limpopo has the largest game industry, is the second largest goat producer, sixth largest beef producer and eight largest sheep producer in the country. The red meat cluster uses 70% of the land area in Limpopo.

With regard to poverty eradication and economic development, most livestock (cattle and goats) are owned by communal farmers with herd sizes of 13 compared to national average of 19. Furthermore, because Limpopo has the most number of restitution claims, the current strategy should be development oriented to support the growth of emerging farmers.

2.5.1.1 RANGELANDS AND PASTURES

Limpopo covers an area of 12.5 million ha, approximately 10% of national land area with the natural vegetation mainly being savannah, characterized by open grasslands with scattered trees and shrubs. The vegetation is now seriously encroached by various bush species. There are only small patches of pure grassland in the Springbok flats, Mokopane, and east of Polokwane. In general, the province's rangeland resources are severely degraded resulting in the province having the highest veld degradation index in the country. This could be a function of phenomena such as deforestation and change in plant especially in communal areas, alien species and the high susceptibility of soils to erosion where both croplands and grazing lands are affected by sheet and gully erosion.

Limpopo is sub-tropical with summer dominant rainfall (annual range 350 to 1 000 mm) and high temperatures and potential evaporation in summer months with the northern half of the province being arid climatic while the southern part is semi-arid. These climatic conditions offer opportunity for developing planted pastures to augment natural veld, in some areas where adapted grass species can be establishment under dryland conditions to improve fodder flow.

2.5.2 INDUSTRY COMPETITIVENESS

From the competitiveness perspectives, the red meat cluster in South Africa varies. The country imports 25% of beef, which includes classes of products typical of those produced in communal areas. The irony is that communal beef farmers only contribute 5% to the market. The same applies to mutton where the country imports 35% of the products despite the fact that communal farmers own large numbers of goats, which could substitute for mutton.

At provincial level, despite the small sheep population in Limpopo, the province has a stock of adapted genotypes such as the Pedi sheep and indigenous goats, with great potential for novel genetic research. The province also has a stock of indigenous cattle such as Nguni and Bonsmara with similar potential. Furthermore, besides this static competitive advantage, the province also has infrastructure at agricultural development centres to conduct research in a wide range of animal production areas including pastures.

2.5.3 VALUE CHAIN ANALYSIS

Limpopo has great potential to increase its competitiveness in red meat production. Even though the feedlot industry accounts for 75% of beef consumed in South Africa, the high proportion of cattle and goats in the hands of communal farmers provides an opportunity for organic farming in Limpopo. The province has identified the Nguni and goats projects for this purpose. This offers ample research opportunity to improve universal access and competitiveness in the province. Other initiatives include the development of integrated beef and game enterprises to promote universal access to the value chain.

In general, the sustainability of the red meat cluster depends on four aspects. Firstly, because of its dependence on pastures, frequent droughts and the changing rainfall pattern threaten fodder supply to livestock and require drought mitigating innovation. Secondly, the interaction between game and livestock poses serious risks for disease outbreaks and require thorough analysis of the production systems to develop optimal production systems. Thirdly, the high prevalence of stock theft in Limpopo threatens the spread of diseases and also requires technologies for mitigation. Finally, the severe veld degradation requires innovation to mitigate the phenomenon and improve fodder flow. Table 5 summarises the constraints and mechanisms to overcome them.

Table 5: Analysis of constraints for the red meat and mechanisms to overcome them

Constraints	**Strategic intervention**
Poor alignment of postgraduate training with departmental projects	Align postgraduate training with departmental projects
Climate change and drought conditions	Innovation on drought mitigating technologies
Stock theft	Innovation on traceability
Disease outbreaks	Develop an integrated livestock/game production system
Low production rates	Innovation to improve productive efficiency and pre-weaning mortalities
Erosion of indigenous genetic resources (IGR)	Conservation programs (in-situ and ex-situ) and sustainable utilization Develop molecular genetics research programmes around IGR
Alien invasive plants	Innovation to control alien invasive plants
Veld degradation	Initiate research to address veld degradation and rehabilitation
Lack of veld management systems	Develop veld management systems to improve productivity of communal areas and newly settled farmers
High stocking rates	Innovations to address overstocking

2.5.4 KEY FOCUS AREAS

The department has prioritised the development of organic beef and chevon. This should also be prioritised in the current research and innovation strategy with a view to expanding market access for emerging farmers. Other priorities will include risk

mitigating technologies to reduce the impact of drought, alien plants, stock theft and diseases as well as the conservation and utilisation of indigenous genetic resources. In the near future, bio-technology instruments such as molecular genetics should be used to enhance the competitiveness of the red meat industry.

3. ORGANISATIONAL STRUCTURE

The organizational structure to implement the current strategy should optimize the current capacity in the Livestock Research & Innovation division. The division shall be headed by the Manager, who shall in turn report to the Senior Manager – Research Services. The critical portfolios under the Manager are the Specialist Research Scientists, Senior Researchers and Researchers covering a wide range of disciples: (i) Production Systems, (ii) Breeding and Genetics, (iii) Reproductive Physiology and Biotechnology, (iv) Animal Nutrition, (v) Rangelands and Pastures, and (vi) Post-Harvest Technologies. Since human capital development has been identified as one of the key priority areas of the strategy, a carefully planned recruitment, selection and retention plan is crucial in the various livestock disciplines; amid global scarcity of such expertise.

4. IMPLEMENTATION PLAN

The implementation for this strategy follows a logical sequence of priority areas for the livestock industry in Limpopo. The immediate priority is the creation of a suitable environment for conducting research, followed by medium term interventions to address existing challenges such as drought while strategic interventions such as breeding, nutrition and health research adopt a long term view. The expected outputs from strategic interventions on each commodity are listed in Tables 6 through 10 (Annexure B). Achievements of these targets will depend entirely on availability of resources such as budget allocation as well as of human capital. The proposed implementation plan was also summarised following a discipline based approach to develop themes/key focus areas across disciplines (Table 11, Annexure C).

5. MONITORING AND EVALUATION PLAN

The plan describes the procedure for project approval, monitoring and evaluation; supported by appropriate human capital including both internal and external stakeholders. All research projects are subject to approval by the departmental Research Committee. The Research Committee has been established to evaluate, recommend and/or approve agricultural research projects to be conducted in the

province. This includes all departmental research done by departmental officials and other organisations. Departmental research as well as studies that involve departmental research inputs must conform to the vision and mission of the department. Further details are outlined in the Research Committee TOR.

5.1 MONITORING PLAN

Project leaders will be responsible for the development of project proposal as well as the monitoring of project implementation. Each project will be implemented by a project team whose size will depend on the project workload. The responsibilities of project leaders and members of project teams can be distinguished as follows:

- Responsibilities of project leaders:
  - Development and submission of proposals
  - Collation of individual reports from project team members
  - Quarterly and annual progress reporting to project approval committee
  - Project monitoring
    - Review project implementation schedule
    - Review resource allocation

- Responsibilities of project team members:
  - Development of work plan for relevant project activities
  - Execution of project tasks in accordance with project plan
  - Monitoring of relevant project activities and reporting deviations to project leader
  - Monthly/Quarterly progress report to project leader on project activities

5.2. EVALUATION AND CONTROL

Project evaluation will consist of two types of assessment, i.e. progress evaluation and impact assessment. The purpose of progress evaluation will be to measure the achievement of project objectives on a quarterly basis. This evaluation will be integrated with the departmental performance management system but enriched by the quality checks from the project leaders and project approval committee. This objective evaluation will remain the line responsibility of the Livestock Research Manager. Progress evaluation may be accompanied by other forms of quality control such as project visits as agreed with accounting officials in the department.

Impact assessment will be done annually and over a medium term. This will also be negotiated with other stakeholders in the department to establish task teams to make assessment of positive and negative results of research projects, over time. The difference is that impact assessment may use indicators outside the business plan of the sub-branch. For example, indicators for impact assessment can be divided into research impacts and development impacts. Research impacts can be measured through new discoveries, reports and publications while development impacts can be measured through rate of adoption, social impacts, economic impacts and environmental impacts.

6. ANNEXURE

6.1 ANNEX A: POLICIES AND LEGISLATIVE FRAMEWORK

The strategy is guided by various legislative frameworks:

- Agricultural Research Act, 1990 (Act no. 86 of 1990)
- Animal Improvement Act, 1998 (Act no. 62 of 1998)
- National Water Act, 1998 (Act no. 36 of 1998)
- National Environmental Management Act, 1998 (Act no. 107 of 1998)
- National Environmental Management: Bio-diversity Act, 2004 (Act no. 10 of 2004)
- Meat Safety Act, 2000 (Act no. 40 of 2000)
- Animal Identification Act, 2002 (Act no. 6 of 2002)
- National Forest and Veld Fire Act, 1998 (Act no. 101 of 1998)
- Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983)
- Animal Disease Act, 1984 (Act no. 35 of 1984)
- Animal Protection Act, 1962 (Act no. 71 0f 1962)
- Fencing Act, 1963 (Act no. 31 of 1963)
- Plant Breeders' Rights Act, 1976 (Act no. 15 of 1976)
- Plant Improvement Act, 1976 (Act no. 53 of 1976)
- Veterinary and Para-Veterinary Professions Act, 1982 (Act no.19 of 1982)
- Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act no. 36 of 1947)
- Genetically Modified Organisms Act, 1997 (Act no. 15 of 1997)
- Communal Land Rights Act, 2004 (Act no. 11 of 2004)
- Restitution of Land Rights Amendment Act, 2003 (Act no. 48 of 2003)
- Communal Property Association Act, 1996 (Act no. 26 of 1996)
- Extension of Securities of Tenure Act, 1997 (Act no. 62 of 1997)
- Agricultural Sector Strategy of 2001
- South Africa's National Research and Development Strategy 2002
- National Biotechnology Strategy of 2001
- Limpopo Employment Growth and Development Plan 2009 - 2014
- Indigenous Knowledge Systems (IKS) Policy of 2004
- The ten year plan for science and technology

6.2 ANNEX B: IMPLEMENTATION PLAN

Table 6: Implementation plan for aquaculture commodity

Measurable objective	Performance indicator	Target				
		2010/11	2011/12	2012/13	2013/14	2014/15
Development of research human capacity	Number of postgraduate studies	0	1	1	1	1
Research and Technology development	Number of research projects	0	1	1	2	2
Distribution and dissemination of research information	Number of formal and information publications	0	0	1	1	2
Development of research infrastructure	Number of research infrastructure	0	0	1	0	1

Table 7: Implementation plan for poultry commodity

Measurable objective	Performance indicator	Target				
		2010/11	2011/12	2012/13	2013/14	2014/15
Development of research human capacity	Number of postgraduate studies	1	1	1	2	2
Research and Technology development	Number of research projects	1	1	1	2	2
Distribution and dissemination of research information	Number of formal and information publications	1	1	1	1	2
Development of research infrastructure	Number of research infrastructure	0	0	1	1	0

Table 8: Implementation plan for pig commodity

Measurable objective	Performance indicator	Target				
		2010/11	2011/12	2012/13	2013/14	2014/15
Development of research human capacity	Number of postgraduate studies	0	1	1	1	2
Research and Technology development	Number of research projects	0	1	1	2	2
Distribution and dissemination of research information	Number of formal and information publications	0	0	1	1	1
Development of research infrastructure	Number of research infrastructure	0	0	0	1	1

Table 9: Implementation plan for dairy commodity

Measurable objective	Performance indicator	Target				
		2010/11	2011/12	2012/13	2013/14	2014/15
Development of research human capacity	Number of postgraduate studies	1	1	1	1	2
Research and Technology development	Number of research projects	1	1	1	1	2
Distribution and dissemination of research information	Number of formal and information publications	0	1	1	1	1
Development of research infrastructure	Number of research infrastructure	0	0	0	0	1

Table 10: Implementation plan for red meat cluster commodity

Measurable objective	Performance indicator	Target				
		2010/11	2011/12	2012/13	2013/14	2014/15
Development of research human capacity	Number of postgraduate studies	1	2	2	2	3
Research and Technology development	Number of research projects	2	2	2	2	3
Distribution and dissemination of research information	Number of formal and information publications	1	1	2	2	2
Development of research infrastructure	Number of research infrastructure	0	1	1	1	1

6.3 ANNEX C: THEMES AND KEY FOCUS AREAS

Table 11. Summary of key focus areas across livestock disciplines

Themes	Sub-themes
1. Research capacity development	❖ Alignment of postgraduate training ❖ Internship ❖ Staff formal training
2. Breeding and genetics research	❖ Quantitative and molecular genetics technologies ❖ Improved productivity ❖ Adaptability and genetic resistance ❖ Characterisation, conservation and sustainable utilization of IGR ❖ Application of IKS
3. Risk mitigation technologies	❖ Early warning systems and drought mitigating technologies ❖ Animal health and disease outbreaks ❖ Product traceability ❖ Stock theft mitigating technologies
4. Nutrition and feeding	❖ Grazing strategies ❖ Alternative feeding ❖ Fodder-flow planning ❖ Rangelands and planted pastures
5. Post harvest technologies	❖ Product development, quality and market access ❖ Value adding technologies ❖ Application of IKS
6. Environment	❖ Waste management ❖ Optimization of water use and efficiency ❖ Impact of climate change on livestock
7. Production systems research	❖ Communal production system ❖ Intensive production system ❖ Extensive and semi-intensive production system (e.g., dairy ranching, ❖ Integrated production system

6.4 ANNEX D: LIST OF REFERENCES

Department of Agriculture (1995a). Broadening access to the Agricultural Thrust. Government of South Africa: Pretoria

Department of Agriculture (1995b). The white paper on agriculture. Government of South Africa: Pretoria

Department of Agriculture (1998). Guide for National Land Care programme focused investment component 2001/2002. Government of South Africa: Pretoria. Available at: http://www.nda.agric.za/

Department of Agriculture (2000a). Vision and mission. Government of South Africa. Pretoria. Available at: http://www.nda.agric.za/

Department of Agriculture (2000b). Comprehensive Agricultural Support Programme. Government of South Africa: Pretoria. Available at: http://www.nda.agric.za/docs/CASP/CASP.htm

Department of Agriculture (2000c). Land Settlement. Department of Agriculture: Pretoria. Available at: http://www.nda.agric.za/docs/settlement/htm

Department of Agriculture (2000d). Land Care South Africa. Government of South Africa: Pretoria. Available at: http://www.nda.agric.za/docs/landcarepage/landcare.htm

Department of Agriculture (2001). Agricultural Sector Strategy. Government of South Africa: Pretoria

Department of Agriculture (2001). Land Redistribution for Agricultural Development. Government of South Africa. Pretoria. Available at: http://www.nda.agric.za/docs/setthement.htm

Department of Agriculture (2003). National livestock industry strategy and implementation plan. Government of South Africa: Pretoria

Department of Agriculture (2004). AgriBEE reference document. Government of South Africa. Pretoria. Available at: http://www.nda.agric.za/docs/AgriBEE/default.htm

Department of Agriculture (2008). Land and Agrarian Reform Project: The concept document. Government of South Africa: Pretoria. Available at: http://www.nda.agric.za/docs/larp/LARP_25Feb08.pdf

Department of Agriculture (2008). The Land and Agrarian Reform Project: The concept document. Government of South Africa: Pretoria

Department of Agriculture (2004). Strategy and implementation framework for the pork industry. Government of South Africa: Pretoria

Department of Science and Technology (2002). The national research and development strategy. Government of South Africa: Pretoria

Economic Commission for Africa (2005). The Millennium Development Goals in Africa: Progress and challenges. ECA Documents and Distribution Unit: Addis Ababa

Limpopo Department of Agriculture (2005). Strategic plan 2005-2010: From farming to agricultural industrial development. Limpopo Provincial Department of Agriculture: Polokwane.

Limpopo Department of Agriculture (2008). Livestock research and innovation strategy: Terms of reference. Limpopo Provincial Department of Agriculture: Polokwane. Unpublished

Limpopo Department of Agriculture (2008). Annual Performance Plan 2008/09 to 2010/11. Limpopo Provincial Department of Agriculture: Polokwane

Limpopo Department of Agriculture (2009). Annual Performance Plan 2009/10 to 2011/14. Limpopo Provincial Department of Agriculture: Polokwane

Limpopo Provincial Government (2004). Growth and Development Strategy 2004-2014.

Limpopo Department of Agriculture (2008). Strategic plan for pig development in the Limpopo province 2007/2008. Limpopo Provincial Department of Agriculture: Polokwane

Mbeki. M. (2008) Business Unusual: All hands on the deck to speed-up change. State of the Nation address on the 8th of February: Cape Town

South African Pork Producers Organisation (2009). Highlights of SAPPO's national annual general meeting 2009. http://www.sapork.com.

The South African Poultry Association (2007). The South African poultry industry profile for 2007. www.sapoultry.co.za

Vaughan. A. (1997). An assessment of the current rural development policy framework: A paper prepared for the poverty and inequality study. Institute for Social and Economic Research: University of Durban Westville

OHCHR (2002) Draft guidelines: A human rights approach to poverty reduction strategies. United Nations: Geneva.

USDA, Foreign Agricultural Services (2007). South Africa poultry and products annual 2007. *www.thepoultrysite.com*.

The World Bank (2006). The World Development Indicators. Development Data Centre. The World Bank: Washington, DC.

The World Bank (2007). Sourcebook for evaluating global and regional partnership programmes: Indictive principles and standards. Independent Evaluation Group: Washington, DC. Available at: http://www.worldbank.org/ieg/grpp

Zuma JG (2009). State of the nation address on 3rd June 2009 in Cape Town.









CONTACT INFORMATION:

Research Services

Limpopo Department of Agriculture (LDA)

67/69 Biccard Street

Polokwane, 0700

Tel: +27 15 294 3000

Web: www.lda.gov.za