



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Agriculture and Animal Breeding in the Republic of South Africa

Dr. Johan F. Kluyts Ph.D.

1. Introduction

To understand the diversity and the importance of agriculture and animal production in South Africa it is important to first give a general introduction to South Africa. This introduction will include a short overview of the climatic conditions that influence agriculture, the importance of agriculture to the South African economy as well as some distinguishing characteristics of agriculture and animal production.

1.1 General

Agriculture is the foundation of a developing economy, and since South Africa has a developing economy one cannot put enough emphasis on the value and importance of agriculture for the South African economy. We, therefore, need to ensure a healthy agricultural industry that can contribute to the GDP, food security, social welfare, rural security, job creation and eco-tourism while adding value to raw-materials. However, the health of the agricultural sector depends on sustainable practises. Practises, policies and methods must, therefore, protect the long term productivity of natural resources to reduce risk and to ensure profitable yields as well as the well-being of farmers and farm workers.

In South Africa we see an increase in the need for food as well as changes in food consumption. South Africa's population is increasing at 2% per annum and is expected to reach 82 million by the year 2035. This increase is not only the result of a natural but high birth-rate but also due to the influx of illegal immigrants from neighbouring countries (Zimbabwe, Botswana and Mozambique) as well as some other African countries (Nigeria, Ethiopia etc.). This means that food production and the import of food must more than double to feed the growing population. With the many challenges facing farmers (which I will mention later) this task is as good as impossible. The South African middle-class has increase by more than 30% since the year 2001. This increase in buying power allowed a shift from a staple grain based diet to a more diverse diet. We have seen a decrease in maize and bread consumption and an increase in the consumption of chicken. The annual consumption of chicken increased from 6 kg per person to 27 kg. Egg consumption doubles while the consumption of fruit and vegetables remains constant. During the same period the consumption of beef, mutton, pork and milk declines.



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There are numerous problems and challenges faced by farmers which is (and will be) a threat to their ability to meet the increasing demands for food:

- Rising input costs (due to a certain extent to the unfavourable exchange rate and some unfavourable economic policies).
- Dependence on external factors that farmers cannot control (climate change, international oil price, exchange rate).
- Finite (and declining) natural resources (looming water scarcity, increasing loss of soil through degradation and erosion, loss of agricultural land due to competing human activities activities)
- Lack of subsidies and extension support for commercial farmers.
- Very little market predictability and non-tariff trade barriers in importing countries.
- Increasing competition from cheap, subsidised imports.
- Exposure to a number of toxic chemicals.
- High murder rate of farmers (aggravated by the government's inability and unwillingness to do something about it)
- Increasing tenure insecurity caused and aggravated by the government's political agendas.
- Predicted negative long-term changes in the climate.
- Decreasing health of our supporting natural systems.
- Government's land reform policy with its 90% failure rate.

Mainly because of the above mentioned challenges faced by farmers we saw a 31% decline in the number of farmers. This left the industry with less than 40 000 farmers to feed a population of about 50 million under very challenging and unfriendly conditions.

1.2 Structure of the agricultural industry in South Africa

All agriculture in South Africa resorts under the Department (Ministry) of Agriculture, Forestry and Fisheries. The department aims to lead and support sustainable agriculture and promote rural development through:

- ensuring access to sufficient, safe and nutritious food
- eliminating skewed participation and inequity in agriculture
- maximising growth, employment and income in agriculture
- enhancing the sustainable management of natural agricultural resources and ecological systems
- ensuring effective and efficient governance
- ensuring knowledge and information management.

Some of the services provided by the Department are:

- education and training, including bursaries
- controlling the formation, registration and supervision of cooperatives



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- releasing crop estimates
- providing statistical information
- quality control through standardising norms and distributing quality control information
- promoting and regulating the quality and health of agricultural products through the National Plant Protection Organisation
- representing South Africa's agricultural interests internationally
- genetic resources regulation, registration and evaluation
- providing veterinary services
- registration of agricultural remedies, pesticides, animal feeds and pet food, fertilizers, plant sterilisation units, animal medicines, pest control operators
- offering inspection services.

Animal breeding resorts under the Registrar of Animal Improvement and is governed by the Animal Improvement Act. The different functions of animal breeding (registration and performance recording) are divided between different organisations. Registration (keeping the herd-book) is done by an organisation registered under the Act as a Registering Authority. The biggest one, registering 53% of all stud animals mainly from smaller breeder's associations, is Studbook. The larger breeders associations or societies (Holstein, Simmental/Simbra and Brahman) are registered as independent registering authorities and do their own registrations as well as registrations for some smaller breeder's societies (e.g. Braford that is with the Simmental Society). Performance recording and the estimation of EBV's is done by either the ARC (Agricultural Research Council), Studbook or the Australian Breedplan.

South African animal breeders are in general very lethargic to accept new technologies and as a result development and application of these technologies lag behind the rest of the modern world. Most breeders still rely on their 'eyes' to select supposedly superior breeding animals. Some rely on quantitative genetics and very few have accepted DNA technology. The potential of DNA technology, not only to provide G-EBV's / marker assisted selection, but also in some other fields can, however, not be ignored. In South Africa DNA technology is also used to identify the carriers of genetic defects and diseases, to establish parentage of animals, especially of embryo transfer progeny, and even to establish ownership of animals in rural communities. At present DNA fingerprinting is utilised in cases of stock theft to a very large extent. Livestock to the value of between R400 million and R500 million is stolen annually. The law states that cattle must be branded and sheep and goats tattooed but, despite this, most animals cannot be identified and ownership proved. DNA profiling now offers a solution to the identification problem and is accepted in court.

1.3 Natural characteristics

South Africa occupies the southern tip of Africa and has a very long coastline that stretches for almost 3000 km from the desert border with Namibia on the Atlantic coast, southwards around the southern tip of Africa, then north to the border with subtropical Mozambique on the Indian Ocean.



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South Africa is a medium sized country with a total land area of 1.2 million square kilometres. That is about one eighth the size of the USA, twice the size of France, more than three times the size of Germany and 15 times bigger than the Czech Republic. This, however, does not mean that SA has a good agricultural potential as we will later see. South Africa is roughly 1600 km from east to west and it is roughly 2000 km from Messina in the north to Cape Town in the south.

South Africa has nine provinces which vary considerably in size. The smallest is the crowded and highly urbanized Gauteng province. The most important forms of animal production in Gauteng are very intensive and include milk production and the production of a variety of milk products (e.g. cheese and yogurt), pig production and poultry production (eggs and meat). The largest province is the vast and empty Northern Cape which makes up almost a third of South Africa's total land area. This area is classified as semi-desert with small areas of true desert. Animal production in this province is very extensive and consists mainly of small stock (sheep and goats) for meat and wool, some beef production and game ranching.

1.4 Climate and topography.

A number of factors influence the climatic conditions of South Africa and, therefore also agriculture, agricultural industries and animal production.

1. South Africa lies roughly between 22 and 30 latitudes south while most of Europe lies north of 40. The Czech Republic lies around 50 latitude north. This means that South Africa is much closer to the Equator and therefore much warmer and with less variation in day length between summer and winter.

2. South Africa's biggest neighbour by far is the ocean, actually two oceans namely the Indian to the east of the country and the Atlantic to the west. West of the country the cold Benguela current sweeps up from the Antarctic laden with plankton and providing rich fishing grounds. However, this current retains its moisture and cause desert conditions to the west of the country. The east coast has the warm Mozambique current that sweeps down from tropical waters causing generous rain to the eastern side of the country.

3. South Africa has mountain ranges running down the eastern side of the country. These mountains have a marked effect on the prevailing winds and therefore also the rainfall. To the east is a well-watered low lying area and to the west is the drier and cooler Highveld.

4. The most important winds are those that blow from the east bringing moisture to the eastern side of the country, the winds blowing from the northern tropical areas bringing summer rain to the central part of the country, the south-eastern bringing winter rain to the Cape and the so called mountain winds to the west blowing from the land to the sea causing very dry and hot conditions in an area already very dry and hot.



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Because of these climatic conditions we can identify 8 major terrestrial biomes in South Africa namely Nama Karoo, succulent Karoo, fynbos, forest, thicket, savannah, grassland and desert. These biomes, or ecological life zones, have distinct environmental conditions and related sets of plant and animal life, as well as distinct forms of animal production that is possible and viable.

Although South Africa is classified as semi-arid it has considerable variation in climate and topography. The great inland Karoo is very dry, extremely hot in summer and icy in winter. In contrast the eastern coastline is well watered with hot and humid summers and mild winters – no frost. The south western area has a Mediterranean climate with wet winters and hot and dry summers. Its most famous characteristic is its wind which blows virtually all year round. The central grassland (also known as the Highveld) is reasonably well watered and saved by its altitude from subtropical extremes in heat. Winters are cold with frost but snow is very rare. (JHB is 1740 m above sea level and receives 760 mm of rain). Further north and east we see a drop in altitude. This is the so called lowveld and savannah areas. The savannah area can be divided in the wet eastern savannah which is a subtropical forest, the drier and extremely hot northern savannah or bushveld and the dry (semi-desert) western savannah also known as the Kalahari.

South Africa's large areas of semi-desert shrub and grassland might suggest a certain poverty in plant life. The fact is, however, that a tract of pristine grassland can hold up to 60 species and the Cape floristic kingdom or fynbos contains over 9000 species including the King Protea our national flower.

1.5 General characteristics of agriculture and animal production.

South Africa has a dual agricultural economy, with both a well-developed commercial farming sector and more subsistence based production systems (communal production systems) in the deep rural areas. Commercial animal production also has a well-defined pyramidal shaped tier structure. We can identify on the top of this pyramid the animal breeding sector. This sector consists of stud breeders producing the genetic material for the second tier. Characteristic of this sector is the more intensive nature of production systems and, in general, the better management. The second tier consists of commercial farmers that produce the products (meat, milk, wool eggs etc.) used by the third tier of the pyramid. The third tier consists of the consumers of these products. This is, obviously, the most important tier and forms the foundation of this pyramid and consequently also for the whole of animal production.

The communal production systems, on the other hand, can only be regarded as primitive. This traditional system of animal farming is the oldest (except for the hunter-gatherer systems) form of agriculture and it is still practised to a large extent in South Africa. Production is very low, productivity poor and management almost non-existent. Not even the most basic veterinarian practices (inoculation, drenching and dipping) are performed. No supplemental feeding is provided even though South Africa has a severe phosphate shortage in the natural grazing. There is no record keeping and marketing is very sporadic. Furthermore, because it is a communal system, there is no conservation of natural resources (typical of 'The Tragedy of the Commons'). These systems are then



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also characterised not only by severe poverty but also by degraded grazing and serious soil erosion. Products produced are usually for own consumption or sometimes sold to buy only the most basic stuff.

The biodiversity, discussed in the previous section, favours the production of a highly diverse range of animal products. Animal production ranges from intensive production systems in the winter rainfall and high summer rainfall areas to extensive cattle ranching in the bushveld, and sheep and goat farming in the arid regions.

Only 82.3% of South Africa's land area of 122.3 million hectares can be regarded as agricultural land and only 13.7% of this can be used for crop production and only 22% of this area (13.7%) can be regarded as high-potential arable land. The greatest limitation is the availability of water, with uneven and unreliable rainfall. Around 1.3 million hectares are under irrigation and about 50% of South Africa's water is used for agriculture. About 68.6% of South Africa's land area consists of grazing and only good for the production of meat, milk, mohair and wool. These figures also indicate the importance of animal agriculture in South Africa and, as a result, livestock farming is the largest agricultural sector.

Cattle farming (especially beef production) is, therefore, the most important form of agriculture in South Africa. There are about 13.8 million cattle in South Africa of which 80% are beef cattle. Cattle farming is practised in all 9 provinces with large numbers in the Eastern Cape (23%), KZN (21%), Free State (17%) and North West Province (13%). This distribution is because the carrying capacity of land increases eastwards in accordance with increases in rainfall. Cattle are, therefore, concentrated in the eastern wetter provinces as well as North West and the Northern Cape. Sheep and goat (about 28 million in total) are largely farmed in the drier western and central areas of the country. The total area of grazing has declined over time due to expanding human settlements and activities such as crop farming, forestry and mining. Sadly, this decline is worst in areas with the best agricultural potential. Another reason for the decline in the total area of natural grazing is the degrading of natural resources (increasing rate of desertification from the west). Animal agriculture close to human settlements also becomes increasingly impossible due to animal theft and concerns about personal security.

Agriculture's direct contribution as a percentage of the GDP has decreased over the past four decades and is currently around 2%. However, due to linkages in the economy agriculture's contribution is about 14%. This implies that the economy is maturing, moving towards the secondary and tertiary sectors. However, farming remains vitally important to the economy with 638 000 people formally employed. It is, however, estimated that around 8.5 million people are directly or indirectly dependent on agriculture for their employment and income.

From what has been said so far it is quite clear that South Africa can be divided into a number of farming regions according to climate, natural vegetation, soil type and farming practices.



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2. Field crops and horticulture.

2.1 Grains and oilseeds

The grain industry is one of the largest in South Africa producing between 25 and 33% of the country's total gross agricultural production. The largest area is planted with maize followed by wheat, sugarcane and sunflowers. Maize is produced mainly in the North West, Free State, Mpumalanga Highveld and KZN Midlands. This high lying area is known as the Highveld, is slightly cooler than the surrounding areas and receives a reasonable amount of summer rain. South Africa is a net exporter of maize mainly to our northern neighbours. Wheat (and other small grains e.g. barley) is produced in the winter rainfall area of the Western Cape. Sunflowers, sorghum and groundnuts are produced in the drier parts of the northern provinces. That is roughly to the north and west of the maize producing area. South Africa is the world's 10th largest producer of sunflowers.

2.2 Sugar

South Africa is the world's 13th largest sugar producer. Sugarcane is produced in 15 areas stretching from the Mpumalanga lowveld along the eastern coastal belt as far south as the Eastern Cape. An estimated 2.5 million ton of sugar is produced each season of which 50% is exported to the rest of Africa, the Middle East, North America and Asia.

2.3 Fruit

Deciduous fruit is grown mainly in the Western Cape and in the Langkloof Valley in the Eastern Cape. Smaller production areas are found along the Orange River and in the Free State, Mpumalanga and Gauteng. This industry's export earnings represent about 12% of South Africa's total earnings from agricultural exports.

Citrus is produced in the irrigation areas of Limpopo, Mpumalanga, the Eastern Cape, Western Cape and KwaZulu-Natal. Pineapples are grown in the Eastern Cape and northern KwaZulu-Natal.

Other subtropical crops - avocados, mangoes, bananas, litchis, guavas, pawpaws, granadillas, and macadamia and pecan nuts - are produced in Mpumalanga Lowveld, Limpopo and in the subtropical coastal areas of KwaZulu-Natal and the Eastern Cape.

2.4 Wine

South Africa is the ninth largest wine producer in the world producing around 3.5% of the world's wine. Over 110 000ha of land are under cultivation, with over 300-million vines. About 84% of wines are produced by cooperatives like the KWV for instance. Over 4 000 primary wine producers employ over 60 000 people. South African wine exports rose from 22-million litres in 1992 to more than 350-million litres in 2011. The largest wine cellar in the world is in Paarl in the Western Cape. Owned by KWV it covers 22 hectares and can store more than 120 million litres of wine.



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2.5 Vegetables

About 40% of South Africa's potato crop is grown in the high-lying areas of the Free State and Mpumalanga. Limpopo, the Eastern, Western and Northern Cape, and the high-lying areas of KwaZulu-Natal are also important production areas. Of the total crop, about 50% is delivered to fresh produce markets and a further 18% processed, with the South African potato processing industry having grown tremendously over the past decade.

Potatoes make up about 40% of vegetable farmers' gross income, with tomatoes, onions, green mealies (maize) and sweet corn contributing about 38%.

Tomatoes are mainly produced in Limpopo, the Mpumalanga Lowveld and Middleveld, the Pongola area of KwaZulu-Natal, the southern parts of the Eastern Cape, and the Western Cape. Onions are grown in Mpumalanga, the Western Cape and the southern Free State. Cabbage production is concentrated in Mpumalanga and the Camperdown and Greytown districts of KwaZulu-Natal.

2.6 Cotton

Cotton is cultivated in Mpumalanga, Limpopo, Northern Cape, KwaZulu-Natal and North West. It constitutes about 74% of natural fibre and 42% of all fibre processed in South Africa. Cotton is grown under irrigation as well as in dryland conditions. 75% of local production is still harvested by hand.

2.7 Tobacco

Virginia tobacco is produced mainly in Mpumalanga and Limpopo, with smaller quantities of Oriental tobacco grown in the Western and Eastern Cape. There are more than 1 000 growers in the country, producing some 34-million kilograms every year on about 24 000ha of land.

2.8 Tea

Honeybush tea grows mainly in the coastal and mountainous areas of the Western Cape and in certain areas of the Eastern Cape. Honeybush has become a commercial crop, with the production of more than 100 tons of processed tea per year. South Africa's industry has seen an improvement in the quality of tea and the establishment of export standards, the construction of a large processing and packaging facility in Mossel Bay (Eastern Cape), increased consumer awareness, the appearance of several brand names on supermarket shelves, and a growing overseas market.

Rooibos tea is an indigenous herb produced mainly in the Cedarberg area of the Western Cape.

2.9 Ornamental plants and cut flowers

Ornamental plants are produced throughout South Africa, but production for export is concentrated in the central parts of Limpopo, Mpumalanga and Gauteng province. The crop includes nursery plants, cut flowers and pot plants. The country's most important plant export products are gladioli,



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proteas, bulbs, chrysanthemum cuttings and roses. Amaryllis bulbs are a lucrative export product to the US.

The fynbos industry is being transformed from wild harvesting to cultivation, with an array of cultivars planted. Further fynbos species have potential for development as crops, provided the necessary research funding can be secured. Dried flowers form an important component of the fynbos industry. A large variety of proteas, cone bushes and other products are well established in the marketplace.

3. Livestock Farming

Livestock is the largest agricultural sector in South Africa, with a population of some 13.8-million cattle (of which 80% are beef cattle) and 28.8-million sheep. Stock breeders concentrate on the development of breeds that are well adapted to our diverse climatic and environmental conditions.

3.1 Sheep and goat farming

South African sheep farming is concentrated in the Northern and Eastern Cape, Western Cape, Free State and Mpumalanga, with Ermelo in Mpumalanga being one of the largest wool-producing districts. About 50% of the country's sheep are fine-woolled Merinos. Other breeds include the locally developed Afrino, a woolled mutton breed adapted to arid conditions, the South African Mutton Merino, the Dohne and the Merino Landrace. South Africa's mutton is mostly produced from the Dorper - a highly productive and locally developed mutton breed for arid regions.

Karakul sheep are farmed in the more arid areas. The indigenous meat-producing Boer goat accounts for about 30% of all commercial goats. The Angora goat, found mostly in the Eastern Cape, is used for mohair production.

3.2 Poultry and pig farming

South Africa's poultry and pig farms are more intensive than the extensive sheep and cattle production, and are found near the metropolitan areas of Gauteng, Durban, Pietermaritzburg, Cape Town and Port Elizabeth. The predominant pig breeds are the South African Landrace, the Large White.

South Africa's annual poultry meat production is around 960 000 tons. Broiler production contributes about 80% to total poultry meat production, with the rest made up of mature chicken slaughter (culls), small-scale and backyard poultry production, ducks, geese, turkeys and other specialised white meat products.

South Africa accounts for around 65% of world sales of ostrich products - leather, meat and feathers. Ostrich farming occurs mainly in the Karoo region with Outshoorn the so called ostrich capital.

3.4 Game farming



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South Africa has more game and a wider variety of game species than most countries. Game farming has therefore grown over the years, and today is a viable industry with great economic potential. The country's main game areas are in Limpopo province, North West, Mpumalanga, the Free State, the Eastern Cape, the Karoo, the Kalahari in the Northern Cape and the thorn scrub of KwaZulu-Natal.

A descriptive game-production model has been developed for optimising intensive animal production on game farms, with the potential to increase the global produce of the game industry by between 8% and 15%.

Game farming's contribution as earner of foreign currency increased during the last couple of years. Except for eco-tourism and hunting (for skins, trophies and meat) with high powered rifles as well as bow-and-arrow, the trade in life animals is on the increase.

3.5 Aquaculture

The aquaculture industry in South Africa continues to make meaningful progress in cultivation technology, marketing strategy, marketing practice and scientific innovation. Mussels, trout, tilapia, catfish, oysters and waterblommetjies (Cape pondweed) are the major aquaculture species. Mussel farming occurs mainly at Saldanha Bay in the Western Cape.

3.6 Dairy farming

Dairy is produced throughout South Africa, with most farms in the eastern and northern Free State, North West, the KwaZulu-Natal Midlands, the Eastern and Western Cape, Gauteng and the southern parts of Mpumalanga. The major dairy breeds in South Africa are the Holstein, Jersey, Simmental/Fleckvieh, Guernsey and Ayrshire.

The dairy industry is important to South Africa's job market, with over 2 474 milk producers, producing 2.6 billion litres, employing about 60 000 farmworkers and indirectly providing jobs to some 40 000 people. 21% of producers produce 3 000 litres per day and 23% less than 500 litres.

3.7 Beef farming

As already mentioned, cattle are found in all 9 provinces. Two major approaches to cattle farming can be distinguished. On the one hand are the better managed and more productive commercial farming systems and on the other is the subsistence or communal farming systems with very poor productivity and generally bad management.

Commercial cattle ranches are found mainly in the North West, Eastern Cape, parts of the Free State and KwaZulu-Natal, Limpopo and the Northern Cape. Popular beef breeds include the indigenous Afrikaner and Nguni and locally developed Bonsmara and Drakensberger. European and American breeds such as Charolais, Hereford, Angus, Simmentaler, Sussex, Brahman and Santa Gertrudis are maintained as pure breeds or used in cross-breeding. Synthetic breeds such as Simbra and Beefmaster are also very popular.



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South Africa produces 85% of its meat requirements, with 15% imported from Namibia, Botswana, Swaziland, Australia, New Zealand and the EU. Local demand generally outstrips production, even though there are untapped reserves in the communal farming areas.

The most important system of beef farming is the so called cow-weaner calf production system. In this system calves suckle until the age of 7-8 months. Replacement heifers are grown out on the farm while the rest (as well as all male calves) are sold (usually to feedlots). There are about 70 feedlots in SA of which 53 are registered with the Feedlot Association. Sizes range from as little as 1 000 animals to more than 100 000. The Karan Beef feedlot with 120 000 animals is the largest in Africa. There are also 530 registered abattoirs for the slaughter of animals.

4. In Conclusion

The strength of SA agriculture lies in our farmer's knowledge and ability to farm in our difficult climatic conditions. It is important to realize that SA farmers do not get any help, support or grants from the government and we still manage to survive. A definite weakness is our farmer's unwillingness to accept change and new technologies. The greatest opportunities lie in the fact that SA is the major economy in Southern Africa and we also have a growing consumer middleclass. The greatest threat, except for our unfavourable climate, lies in our government's unfavourable political agendas. One can only hope that our government will realize, before it is too late, the important role agriculture, especially commercial agriculture, plays in the economy, rural employment and food security.

Farmers in South Africa (and worldwide) will only survive in the long term if we build our farming methods and production systems on the following principles of sustainability:

- 1. Productivity and efficiency should be increased by adopting modern technologies (e.g. genomics) and selecting the better more efficient animals based on their G-EBV's.
- 2. Management, use and protection of all resources (natural as well as genetic) should keep future generations (their requirement and possible choices) in mind without lowering the freedom and humanity of the current generation.
- 3. Risk should be reduced by following a holistic approach. A holistic approach takes all roll players (people, animals and environment) into account.
- 4. Production systems should be economically viable.
- 5. Production and production systems should be socially acceptable as well as satisfying the principles of environmental and animal ethics.