



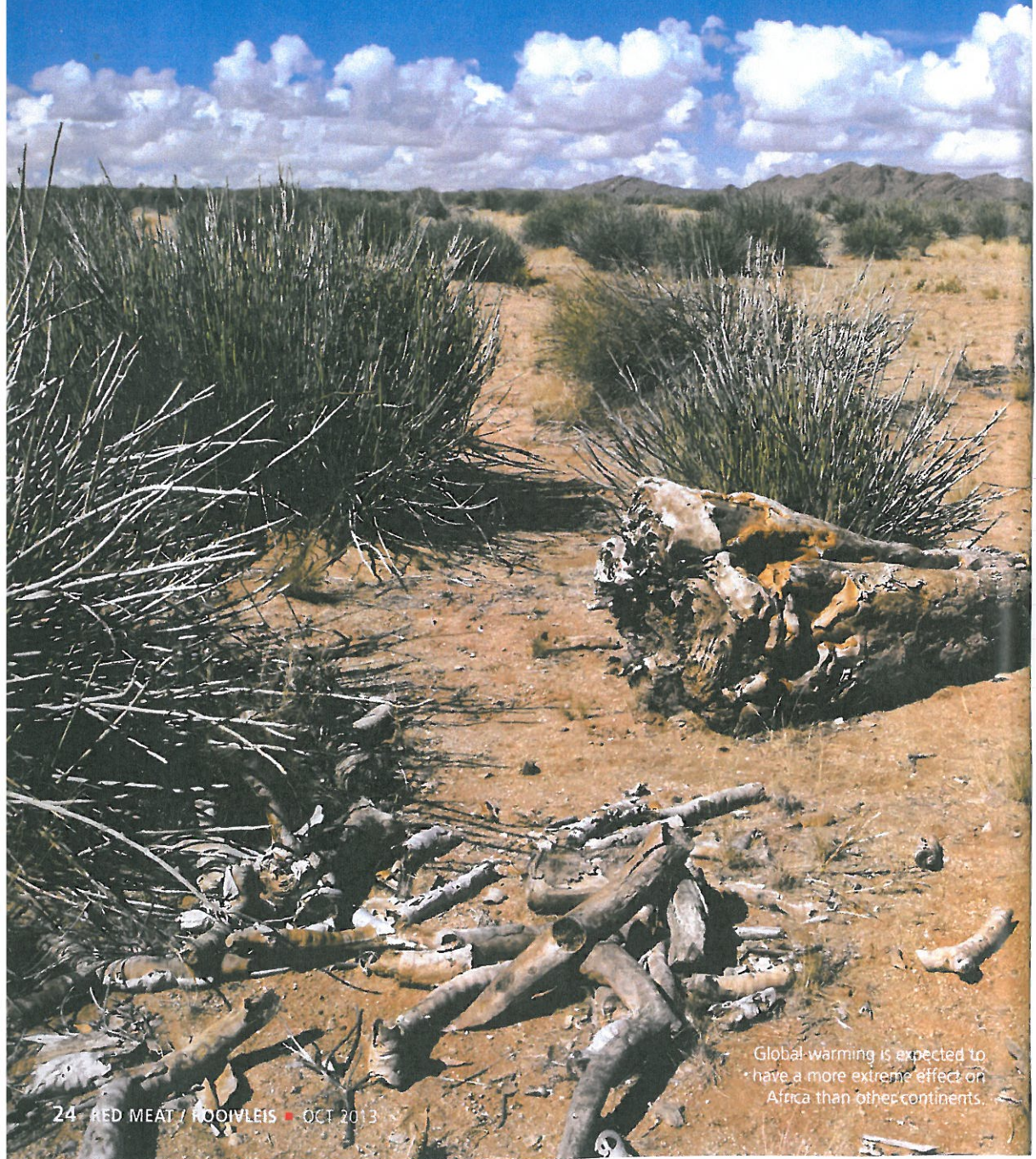
# **National Diploma Farm Business Management**

## **Handout 7 Effect of Climate Change**



# *Effect of* **CLIMATE CHANGE**

by Dr Michiel Scholtz



Global warming is expected to have a more extreme effect on Africa than other continents.

**Livestock is unique in the sense that climate change represents a feedback loop within which livestock production contributes to the problem and suffers the consequences. The impact of global warming and continued uncontrolled release of greenhouse gases (GHG) therefore has twofold implications for the livestock industry, and consequently food security.**

**F**irst, the continuous increase in temperature is predicted to have a direct effect on water supplies, the future distribution of livestock species, their adaptability to increased heat load, incidence diseases, feed supplies, grazing potential, and food (nutrition) security. This is because of changes in temperature, relative humidity, rainfall distribution, altered disease distribution, changes in ecosystem and biome composition, woody species encroachment and alien plant invasion.

Second, the responsibility from livestock production is to limit the release of GHG (the carbon footprint) and water use (the water footprint) to ensure future sustainability. This can be done through improved production efficiency and breeding to reduce the carbon footprint of livestock products.

There is a general perception that livestock is a major contributor to global warming. This is the result of a FAO publication *Livestock's Long Shadow* in 2006, which indicated that livestock is responsible for large quantities of the world's GHG production. This figure has since been proven to be a gross overestimation of the contribution of agriculture. The most recent figure is in the order of 5 to 10% of which livestock contributes about 80 to 90%.

To quote percentages does not make sense. In industrialised countries the figure for agriculture is less than 6%, simply because the contribution of their energy sectors, mining, etc to GHG

emissions is so large. In non-industrialised countries the figure for agriculture can be 40 to 50%, yet that contribution is less than the 6% of the industrialised countries. If mitigation options are considered it is obvious that a 10% reduction in the energy and mining sectors make much more sense than a 10% reduction in the contribution of agriculture. So, the meat free once a week argument will not do much to resolve the problem.

## EFFECT OF GLOBAL WARMING

Global warming is expected to have a more extreme effect on Africa than other continents. It will change the Southern Hemisphere environments and vegetation, and in some areas grazing capacity is expected to decline.

Climate affects animal production in four ways:

- the impact of changes in livestock feed-grain availability and price
- impact on livestock pastures and forage crop production and quality
- changes in the distribution of livestock diseases, disease vectors and parasites
- the direct effect of weather and extreme events on animal health, growth and reproduction.

Tropical and subtropical climates have direct and indirect influences on livestock. Factors such as temperature, solar radiation, humidity and wind all have direct effects on animals. Factors such as digestibility of feed, intake, quality and quantity of grazing, pests and diseases, which are directly influenced by climate change, all have indirect effects on animals.

Altered patterns of diseases in animals are a significant and permanent threat as a result of climate change and may include the emergence of new diseases and a change in the prevalence of existing diseases, particularly those spread by biting insects. A wider geographic distribution of known vectors and/or the recruitment of new strains to the vector pool could result in infections spreading to more and potentially new species of hosts.

Ambient temperature is the factor that has the largest direct effect on livestock production. Most livestock perform at their best at temperatures between 4 and 24°C. In the tropics and subtropics, temperatures often rise above this comfort zone. It is therefore important that livestock are adapted to these higher temperatures. High temperatures and solar radiation lead to a decrease in feed intake and grazing time, whereas sweating and water intake increases. Other factors involved in thermal comfort include the external coat of the animal (thickness, structure, thermo isolation, absorption and reflectivity) and body traits (shape, size and superficial area).

Nutritional stress has the largest indirect effect on grazing animals in the tropics and subtropics. In these environments, natural pastures have lower nutritional value and lower tiller density than in temperate regions. As a result, climate change will have the greatest effect on ruminant species.

Livestock in southern Africa will need to adapt to higher ambient temperatures, lower nutritional value of the grass in some cases, and expansion of diseases, especially ticks and tick-borne diseases because of global warming.

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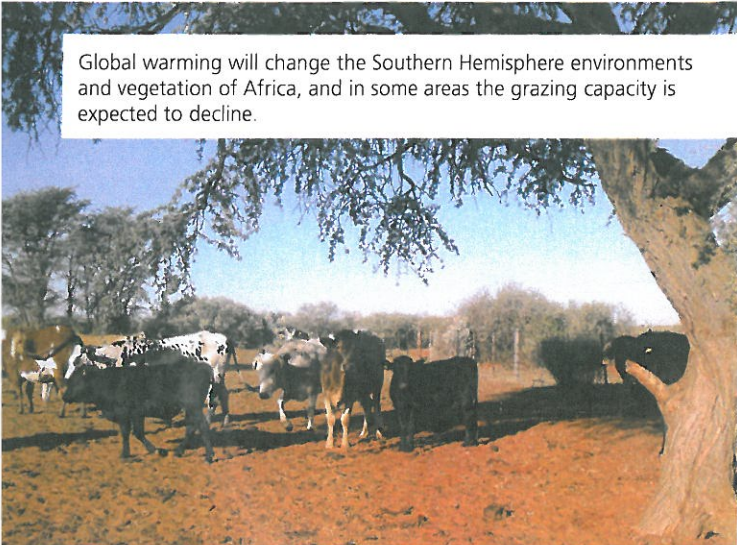
With such challenges, matching genotypes with production environments will become crucial, requiring diverse genetic resources with appropriate genetic potential for growth, milk production, resistance to disease and prolificacy.

Regions and countries that will prosper in a climate-changed world will tend to be those that are early to recognise its importance, foresee implications for their industry (including farms), and take appropriate steps well in advance.

The pace of adaptation to climate change and related policies are likely to determine whether farms, regions and countries will be able to maintain their production levels or even increase their market shares in agricultural products, including beef for the future.

### Adaptation

An improved understanding of the adaptation of livestock to their production environments is important, but adaptation is complex and therefore difficult to measure. Fortunately, there are several proxy indicators available for adaptation such as reproductive,



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production and health traits. The selection of animals and genotypes that are better adapted to the production system, including heat stress, is possible and should be persuaded to ensure sustainable production in hotter climates.

It is also important to note that there are large differences between breeding cattle for the subtropics/tropics and temperate areas, the main difference being trait definition. Cattle in subtropical and tropical environments are subjected to numerous stress factors, such as:

- parasites (tick and tick borne diseases, internal parasites, flies)
- seasonally poor nutrition
- high temperatures or high daily temperature variation
- humidity (both high and low)
- temperament, exaggerated by extensive production systems.

Management interventions may be possible, but they are difficult and expensive to implement, particularly in poorly adapted cattle. The best

method of ameliorating the effects of these environmental stress factors to improve productivity and animal welfare is to breed cattle that are adapted and productive in their presence, without the need of managerial interventions.

### Acknowledgements

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