

Agricultural Production

Agricultural production takes place within the reality of three main resources namely soil, pastures and water. These three individually either create opportunities or place limitations on envisaged production practices. A sound knowledge thereof is imperative.

Soil

All vegetative growth i.e. trees, shrubs, crops, pastures, vegetables or fruits are rooted in the soil. The scale of intensification will depict whether the production takes place under dry land conditions or under irrigation. However, during the planning phase and prior to the implementation of any cultivation, sound research should be conducted on the quality of the soil and if it could support the intended production practice.

Consideration should be given to three attributes of soil. To this end, a trench should be dug in order to study the soil profile, to take samples for analysis and to establish the presence of biological activity. This information will govern the utilization or not of the soil for the proposed cultivation. Collectively, this is commonly referred to as Soil Health which also happens to be an imperative of the national DARD.

Physical properties

This commonly refers to particle size, clay content, water holding capacity and soil depth. These aspects are well documented in Part C - Crop Production and should be studied in great depth. Special note must be taken or acquired about new approaches towards soil cultivation i.e. minimum tillage.

Chemical properties

Whilst all macro and micro (trace) minerals are important to sustain life, N (nitrogen), P (phosphate) and K (potassium), Ca (calcium), Mg (magnesium) and C (carbon) enjoy most attention because, amongst other, the removal thereof via the plants and the need to replenish the soil with such minerals.

Due to a variety of reasons in South Africa, soil salinity must be addressed. The buildup of salts, mainly NaCl (sodium chloride) inhibits sustainable plant production. This is normally neutralized by the addition of agricultural lime (Ca and MgCO₃) to create a conducive mineral status in the soil for optimum production.

Biological activity

Soil Health is a concept which was developed in Australia by a Prof Brian Roberts. The essence thereof is the frailness of any microbial activity in the soil which result from wrong cultivation and planting practices. Lately, agriculturalists determine the C (carbon) content of the soil and the presence of earth worms; indicative of a harmonious medium in which plants can grow, hence the term Soil Health. This could also be brought into context with the philosophy of Land Stewardship.

Pastures

It is important to know the prevailing grass species in the area and on the farm. The presence of certain species indicates an improvement in the pasture quality and others indicate a deterioration thereof. This shift, either way, is brought about mainly by the grazing management employed by the farmer.

Pasture scientist have different views on either rotational grazing, multi camps systems, zero grazing or short-term grazing or high-pressure grazing. However, agreement exist that a farmer must follow a grazing system and that the farm must be planned in such a way that identified camps are allowed a resting period of one growing season.

The number of livestock that can graze a specific area of pasture is referred to as the Carrying Capacity of the veld. This is expressed, as for example, 5 ha per 1 LSU where a LSU is defined as an animal weighing 450 kg in a maintenance production state. This carrying capacity can change from camp to camp, farm to farm and district to district. Normally, areas with higher rainfall like Harrismith and Winterton have a high carrying capacity like 3 ha / LSU whilst lower rainfall areas like the Kalahari and Namibia will have a much lower carrying capacity (20 ha/LSU). When planning a specific farm, it is very important to quantify the carrying capacity of that specific farm. There are numerous ways to gather this data from the Dept. of Agric. or the local Co-op or organized agriculture.

The ultimate carrying capacity is a function of the frame size of the animals on the farm as well as their production phase. For the purpose of clarity, an example will be used with Bonsmara cattle, being a Medium Frame animal in different production stages using the Meissner tables. A typical herd composition during the summer is used to calculate the area of land required to sustain this farm.

Class	Mass	Number / LSU (factor)	Number of animals on farm	LSU on farm
Calf weaned 7 months	200	1.9	-	-
Cow, dry, 3 years of age	450	0.9	-	-
Cow, dry, mature	525	0.9	-	-
Cow with calf, 3 years	450	0.7	25	36
Cow with calf, mature	525	0.7	75	107
Steer & heifers, 18 months	350	1.1	20	18
Steer, mature	550	0.8	-	-
Bull, mature	600	0.7	4	6
TOTAL NUMBER OF LSU			124	167

Whilst there are 124 head of cattle (excluding the calves) on this farm, there are in fact 167 LSU equivalents on the farm. If the agreed upon carrying capacity of the farm is 5 ha/LSU, then the common error could be calculated as follow:

5 ha / LSU with 124 cattle require 620 ha

5 ha / LSU with 167 LSU equivalents require 835 ha

When merely working on the number of animals instead of the LSU equivalents, this farmer will be overgrazing his natural pasture by 25%. He needs to either find additional grazing or reduce his herd.

Water

South Africa is mainly a semi-arid country with limited water resources. Catchment dams locally and in neighboring states alleviate the pressure on this valuable natural resource. The burning issues are the quality and quantity of water for agricultural use.

Quality

Contamination from industrial, urban, domestic and agricultural origin is and will place a continued pressure on this scarce resource. The use of such contaminated water for livestock and crop production will place such enterprises under jeopardy. There are numerous laboratories who can analyze water samples for human or agricultural use. Some of them are the Institute for Ground Water Studies as well as the Centre for Environmental Studies at the University of the Free State. This should form part of any feasibility study.

Quantity

The use of water for agricultural purposes is normally governed by the availability of a water quota. Thus, prior to any ideas of erecting pivots or drag lines or any form of irrigation, confirmation needs to be sourced about the availability of a water quota from the producer. Furthermore, a water quota is no guarantee of sufficient water for an irrigation project. South Africa experience periods of drought which does impair on the availability of surface and underground water. A proper risk analysis should be conducted during the initial planning stages of such projects.