



## Climate and Agriculture, a producer's perspective

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### Abstract

I believe we do not sufficiently value climate which is part of our natural environment. As primary producers we need to re-evaluate this resource to ensure we optimise our production in a financial environment of ever decreasing margins where quality control is of the essence.

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It is pretty obvious to say that we can not have agriculture without climate. What is agriculture? What is climate? Far be it for me to attempt to give a detailed definition of agriculture today, but suffice to say we cannot practice agriculture in whatever form without the essential elements of light and water. The various attributes of climate, including rainfall, temperature, wind, humidity and frost, a metrologist will quickly tell us are all inter-related. As an agriculturist or producer to successfully practise agriculture I must at least understand these attributes, their relationship and effect upon one another, and whether by intuition, experience, accident, or design, be able to use them to maximise the production I seek.

### Climate – an essential resource

In order to quantify the significance of climate in agriculture I believe it should be put in perspective with the other essential resources of agriculture.

Soil - As a medium to produce is a limited resource which can be improved, be degraded, abused, preserved, bought and sold, or lost by sheer neglect.

Finance - Agriculture since first begun has necessitated bartering and trading. Through civilisation this has evolved into the separate necessity for currency of which the availability or not, can restrict, and does restrict the ability to fully exploit most other resources.

People - As a resource of labour and management to pull together is strictly an unlimited resource, frequently inadequate, lacking in foresight and the ability to identify the depth of the disciplines with which it can work, such as climate.

Climate - Is just there, it does not cost anything, we do not have to ask if we can use it, we do not have to give it back, it is free, and like most things which are free we do not use it efficiently or with justification because it is free.

We all know that we, the resource of people, must manage the resource of climate more effectively to survive. To the best of my knowledge, however, we cannot have any direct practical control over climate at present, which only confirms what most of us know: that we do not practise an exact science.

When asked to give this paper, I initially thought I was not qualified and I am not. But if I am not, why am I an agriculturist, I have to be qualified. To succeed in agriculture on the second driest continent on earth, I realise that I must have some knowledge of



climate, I can not manage without it.

Climate knowledge initially is derived, I believe, as we grow up in our understanding of the seasons and weather patterns pertaining to the regions where we live. Those of us who have lived in more consistent climatic conditions, were often oblivious to the importance and dependence we were putting on that knowledge. In Australia, where there is no such thing as an average climate, we notice for example when it does not rain in March for an autumn break or in September for the 'big' spring and we do not forget. We either whinge and complain that "it never used to be like this" or we question, investigate, and seek to understand by asking why.

As a producer I am dependant on the process of photosynthesis occurring in order to survive. So more by necessity than desire I must strive to understand climate, it's complex forces and changes, and understand why the conditions that I want occur and when they will occur. Armed with this increasing and compounding knowledge I should be able to manage our business to take greater advantage of the opportunities that climate offers.

I have not referred to which agricultural enterprises I manage and pursue. In the first instance these could have been determined by the geographic situation in which I have chosen to farm, or the area I chose in which to farm could have been determined by the climate conditions. In my case it was the latter.

My sources of knowledge on climate, weather, and rainfall are basically the same as everybody else. Personal knowledge, personal experience, regional, national and global information are derived from the television, fax, farming and daily papers, computer software and the internet. I find I will not regularly use an information source unless it is easily and readily available and can be read quickly.

#### **Climate vs weather**

I have difficulty distinguishing between the terms climate and weather. To me one means long term, the other short term. I regularly watch ABC weather at 7.25 pm and would consider myself a "chartist". When a regular weather pattern starts to develop obviously I watch the prognosis charts more intently. When these weather forecasts could have a particular advantage to an operation then I will confirm by accessing the metrological sites on the internet and printing off the charts. But to determine whether we should be involved in that particular farming enterprise or should be changing and introducing a new enterprise I will consider the climate.

Twenty four years ago when determining which region of this country in which to farm I first considered latitude as well as the geography of the country, the topography, the elevation and the aspect etc. Some rudimentary metrological knowledge about atmospheric pressure, highs and lows, isobars, the proximity of isobars to one another, the causes of El Ninos (- SOI) and La Ninas (+ SOI), and the interpretation of the SOI index also helped. There is usually a large information source in the rainfall records for most properties and it is the starting point I use to reaffirm the general pattern of climate.

Superimpose all this information on the property map and one goes a long way towards determining the possibilities of which enterprises can be successful. But to make them



really successful one needs to identify the correlations of much of this information to the enterprise production. The opportunities to be attained from this current and future information give the ability to predict the probability of conditions conducive to maximising enterprise output.

### **Using this information on farm**

On Windy Station there is a rainfall metrological station and we have records since 1915. I realise I must adopt a more disciplined approach to utilising this and other information. A study of the 10 year average rainfall versus long term average rainfall shows quite a remarkable rise in the 10 year averages since the early part of this century. This information alone warrants a review of some enterprises or consideration of new ones. This I have not yet done.

Our farming business is a mixed farming operation with many enterprises. In addition to the winter and summer crops we also run approximately 80,000 DSEs which I believe we should be able to increase by 20% through improved pastures, improved grassland management, and the utilisation of these pastures knowing the probability of their performance on a monthly basis. This feed supply, or feedpool budgeting, is done with the pasture production ability being correlated to the mean (average) rainfall and daily temperatures.

The anticipation of regular seasonal conditions is obviously more pronounced in the spring as soil temperatures rise on good moisture to create optimum quality pasture feed for young progeny of autumn and spring calving herds and lambing flocks. For the autumn, forage oats when sown on moisture around the first day of March will provide winter forage turning off prime livestock from mid-May onwards. The high probability of this increase in the feedpool in early winter then allows us to fatten our own cattle, and purchased cattle to have planned body weights suitable for the domestic trade. If sowing moisture does not fall then, however, it is unlikely to occur again until late April or early May. This obviously can have a dramatic effect on fat stock production and gross income.

Knowing the high potential from these two high production periods, suitable temperate species have been identified to optimise the climatic conditions. In addition to the improved permanent pastures and natural pastures we have significant areas of pasture leys incorporated in the farming rotations of our different land management groups. Basically there are two types of pasture ley; one intended to last five/six years consisting of phalaris, fescue, perennial ryegrass, lucerne, and subterranean clovers, the other a three year ley of ryegrass, lucerne and chicory. Some of our permanent improved pastures also include bambatsi panic and medics with some lucerne. Given normal or average probability of rainfall, this balance allows us to meet our feed demand. However, we still have a large area of improved natural pasture which remains the solid core to the feedpool. There is an expected likelihood knowing the climatic conditions that there will be a surplus in feed supply in the spring. This we will conserve either as hay or silage for when the feed supply is in deficit during dry or drought periods. These are just examples of well understood grazing and farming policies relating to climatic conditions each season.



### Climate, enterprises and markets

Periodically sometimes by design, but more frequently by necessity, a change in enterprise is made as a result of climatic conditions to which there will be a justifiable economic advantage. When the SOI index starts indicating an El Nino and the degree of probability for a period of low rainfall is high, we will review our strategy to survive. Stocking rates will be reviewed. The 'turning off' of finished fat stock will be accelerated by supplementary grain feeding, and supplementary liquid protein feeding will be introduced for breeding and young stock to maximise available dry matter. Although we have not done it, I now recognise we have the risk management resources available to consider increasing stock purchases for short periods as well as decreasing stock numbers when extreme climatic conditions are imminent.

Livestock markets are directly related to known climatic conditions. When it is easier to produce prime livestock, market values will be reduced because there is normally an increase in production. Similarly in dry times cattle sometimes are marketed by necessity through lack of feed, this "off loading" of stock will increase supply and decrease returns. We strive to identify the periods when prime livestock are in demand because of a shortage of supply, usually caused by climatic conditions; in other words a window of opportunity.

An excellent example of enterprise change is occurring presently on the southern Liverpool Plains. Winter crop production margins have been under review by many farmers and economists for some time because of the declining commodity prices for winter cereals compared with coarse grains and oilseeds grown during the summer. The probability of November/December rains in this region is quite high which can frequently dilute protein levels in wheat. In more recent years these diminishing returns have been accentuated by an increase in diseases which can become greater during times of higher humidity in the spring. The most recent example is the dramatic effect that fusarium head blight (*Gibberella zeae*) has had on wheat yields. Basically because of the rotational benefits, but also recognising the climatic conditions, an increase in winter oilseeds and pulse crops is occurring.

The further I have gone in writing this paper on this subject, the more aspects of it I now realise I have to look at. It brings me to decide that because climate is not a constant, then there can be no conclusion. As sources of climate information become more readily available we should be able to manage our crops and grass species more closely to their genetic potential. Acknowledging that grassland management by many of us is still frequently inadequate we, the resource of people knowing the capabilities of our plant species, must better manage the resource of climate to ensure our success.