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Farmers as Energy Producers

Farming has been central to the study of economics since that discipline was conceived by Adam Smith in his publication of *The Wealth of Nations* in 1777. Vast tracts of economic theory have since been founded on agricultural statistics and economists have dominated the agenda on the adoption of national farming policies. The central thesis of this work has been: *In a free-market, prices and costs, alone, will determine the best way to meet demand and re-allocate resources accordingly.* This powerful thesis is not wrong and it has been immensely successful in its general application. However, in the contemporary world of expensive energy and environmentally damaging fuels, this thesis is now exposed as not being ***sufficient***.

As food is itself a fuel, its production is subject to the laws of thermodynamics. These considerations must now come before economic theory. There are four inescapable consequences that come from thermodynamics, as it affects farming:

The ***natural landscape*** in the United Kingdom is a ***managed landscape*** in a state of dynamic equilibrium with *Nature*

All changes made to the landscape will take work (by *Society*) or absorb energy (from *Nature*). Change, of any kind, never comes free.

The conversion of energy from one form to another always results in an irretrievable loss of energy. In particular, the industrial energy content of artificial inputs (such as fertilisers) can never be recovered in the food produced. As food energy units are inexpensive and industrial energy units are increasingly more-expensive (its being electricity for the Haber-Bosch process) these energy costs can never be recovered for two inescapable reasons – firstly, through the conversion losses, and secondly, through the significant price differentials of the respective costs of the energy units of food and electricity. The irrecoverable losses are the consequence of a phenomenon termed ***entropy*** (essentially the science of decay). Economists, with no recognition of the impact of thermodynamics or any concept of entropy, have consistently advised that with the right “prices” fertiliser use can make economic sense. We have to recognise now that whatever “prices” were used to justify this, the calculations must have been wrong.

Nature follows a path-of-least-resistance in a series of random steps when faced with changes or decay. Its destination will be determined by its starting position. This is why no two, newly-created, "identical" habitats will deliver the same results. Decay is disorder, but when this disorder becomes chaotic *Nature* will produce some limited order within the chaos through a phenomenon known as ***resonance***. This why when faced with instant and massive changes, such as a no-interference re-wilding, *Nature* will deliver an unpredictable outcome which often disappoints but will, almost certainly, produce a dominant species (through resonance) until a new equilibrium is established. *As an aside, economists specifically reject the concept of an equilibrium in any system (despite the fact that "prices" represent an equilibrium point between supply and demand at a point in time)*.

The implications of this different perspective for farming, and businesses, will be profound. The use of inputs in farming with an industrial energy content can only result in reduced profits. Economists will contest this vigorously, but in doing so they are confusing the effects of macro-economic theory (relating to national accounts / sectoral performance) with micro-economic theory (relating to management accounts / business performance). Profitability at a farm business level is determined by micro-economic theory not macro-economics. Also, the marginal costs which are often used by economists to justify expansions of output (and which are derived from macro-economic theory) are positively mis-leading at a business operations level.

If farming is viewed as an activity that converts sunlight into food products, it can claim to be the biggest energy converter in the UK economy. The amount of sunlight energy falling on the agricultural area of the UK is equivalent to the output of over 200 million standard power stations; the conversion rates are vanishingly small, of course, but the energy comes as "free-issue".

A better appreciation of the impact of energy considerations by farmers on their commercial prospects will lead, ultimately, to a greater degree of profitability and an expansion of output to true sustainable levels.