

Proper Business Accounting for *Natures' Bounty* in Farming Undermines the Theory of the *Economies of Scale*

Note 04 November 2019

Abstract

Livestock outputs are driven by the grass available on farms, but when the grass runs out, the subsequent use of substitutes and feedstocks will reduce (and often reverse) its profitability. Applications of the traditional *economies of scale model* in these circumstances are erroneous and mis-leading.

Introduction

In a study of the patterns of profitability in hill farms in the north of England there was anecdotal evidence from farmers that they seemed to lose less money (before support payments) as they down-scaled their activities. To them this made no sense as it conflicted with their deeply-held belief that profitability was driven entirely by output volumes. The study showed that, as grass was in limited supply and essentially provided by *Nature* on a “free-issue” basis (in industrial terms), the whole theory of the traditional economies of scale in production was undermined by the need to purchase expensive substitutes (hay and feedstocks at the point at which the grass ran out) which turned the expected linear variable costs line into a non-linear shape.

Methodology

The variable costs (items directly driven by volume) were categorised into two groups for the study. These were: (a) the *productive* variable costs (PVCs), such as contract labour and energy, and (b) the *corrective* variable costs (CVCs), such as grass substitutes such as feedstocks. The objective was to establish the point of inflection in the variable costs line where the cost gradient changed with the onset of new expenses. As no farms recorded their costs in such a way that the timing of these extra costs was known, only the total (composite) variable costs were available. The gradient of the PVCs could be established (by subtracting the CVCs in total) and, then, by taking two years data (with different total cost outcomes) and projecting backwards a line joining these end-points, the point of intersection with the PVCs line was established. This point of inflection was defined as the position of *maximum sustainable output* (MSO) – sustainable in the sense that the output was supported wholly by natural grass.

Results

In those farms where revenues and costs delivered a *break-even point* (using the traditional economies of scale model) the new break-even point occurred at a lower level of output. However, when outputs went beyond the MSO point (and the gradients of the variable costs line increased, often dramatically) there was the likelihood of a *break-back* point when farms suddenly returned to a state of un-profitability. Further increases in output then exacerbated the losses.

Many farms, before support payments were included, simply did not pass a break-even point with its PVCs line. In some of these cases, farm revenues were not sufficient even to cover PVCs alone. That is, their level of unprofitability was such that farms simply lost cash from the start (as opposed to the general belief that the issue being faced was the level of its contribution to fixed cost commitments).

Even with the very few farms that enjoyed a revenue line that had a steeper gradient than its CVCs line (and so never experienced a break-back point) the levels of profitability were lower than those predicted by the adoption of the traditional economies of scale theory.

Conclusions

On hill farms, the grass available per hectare is often significantly lower than that available to lowland farms. With carcasses being delivered into a commodity market, the farms with more abundant grass effectively set the prices. Hill farms thus struggle to overcome the disadvantages of elevation; this can be exacerbated (as will happen in England) when this physical disadvantage is compounded by further disadvantages in latitude (and sunshine) too. This research suggests that these marginal and upland farms pivot away from producing for commodity markets, and toward a focus on added value, with lower outputs per farm, and turnover achieved instead through collaborative branding with other farm businesses.

The pattern of profitability, driven by the impact of CVCs on results, may pose a more fundamental question. Does the use of feed substitutes (and fertilisers) which are expensive (especially when manufactured) break the second law of thermodynamics? That is, it is impossible to put into a product less energy than is subsequently taken out and so unless feedstocks are cheaper than natural grass (unlikely with grass being “free-issue”) the farmer cannot win with his purchases.