

H. Thiel, “Description and Yield Calculation of a Sugar Beet Economy” (1874)

Abstract

While in other countries cereals formed the basis for the intensification of agricultural production after 1850, in Germany it was root crops. None was more important than the sugar beet. Scientific studies devoted to sugar beets, such as this one from 1874, aimed to improve yields but also to develop technologies that maximized the productivity of all arable land. Germany's long relationship with sugar beets was glorious. In 1747, a German chemist was the first to extract sugar from the crop. The first beet sugar factory opened in German Silesia in 1810. During Europe's twentieth-century wars, sugar produced from beets using techniques perfected by German scientists became the primary source of sucrose for hundreds of millions of people who were cut off from sugarcane from the tropics. Today, beet sugar accounts for nearly all sugar production in the European Union.

Source

Economic reports and yield calculations, if based on real, not fabricated, data, can have great value in various ways. They alone provide accurate insight into the economic situation of an industry like agriculture, which is certainly among the most important for the public weal, and they make it possible to arrive at correct answers to a number of the most interesting economic questions. It is known, for example, that the cultivation of land on smaller estates has frequently been considered preferable to the same on a large enterprise, the focus here being on the small farms' [comparatively] higher gross and net yields. This last relationship may have been correct as long as both types of farm were informed by more or less the same farming practices. On the small farm, the personal participation of the owner and the greater care and constant control he exercised enabled better cultivation and greater savings than was possible for the large landowner to achieve. Now, though, where the large estate operates with greater capital and intelligence, using all the tools of science and technology, it can perfect cultivation and achieve gross yields that even the most careful of small enterprises cannot surpass, at least not with the same crops. The advantages of the small farm in terms of cost savings and all those points where the owner's personal attention plays a role are more than made up for by the profitable use of machines, and for individual branches of the sector by the specially trained technicians, workers, and other employees that only the large estate can offer. Even if the question of the best organization of rural property ownership for the state cannot be determined solely on the basis of a productivity calculation (the disadvantage of lower productivity in one system could easily be offset by other advantages for the overall economy arising from the livelihoods secured for a greater number of families owning small farms), then it is extremely important to record these factors as precisely as possible so that it is possible to weigh them against each other in the first place. A number of such economic reports and calculations, offered to us from various parts of Germany by a very reliable source, will be used for this purpose. At the same time, these calculations will shed light on the frequently debated tax question about the relationship of individual taxes to the total costs of the economy and what relief for the agricultural sector can be expected from a tax reform. The computations can provide material for agricultural costs and valuations, and will certainly also lead to interesting comparisons, while the methods communicated therein could directly benefit farm management.

Since it is important to take data from actual practice, anonymity will be required in most cases; however, the

editor will only incorporate those calculations that are based on data whose accuracy can be assured.

Climate and soil.

The estate is located in an area where sugar beet cultivation is flourishing and the culture of farming has been raised to a high level. The fact that sugar beets thrive so splendidly in this area means that the climate and soil have created equally favorable conditions for the cultivation of almost any crop. Most of the soil of this particular estate was once flooded, and it changes from black, humusy, nutrient-rich soil to a lighter, cooler loam, with a host of gradations in between. The substratum is loam throughout. Only a small portion, about 170 morgen, is located on the western slope of a ridge a several hundred feet in elevation. The topsoil is shallow there, 4 to 5 inches, comprised of a clay and limestone mixture with a predominantly calcareous substratum. [...]

Farming system and crop rotation.

Turning now to the management of this estate in more detail, it should be noted, regarding the operation's antecedents, that for some 25 years, until the beginning of the [18]60s, it was in the hands of a very capable farmer. Under his leadership, the estate was run according to an improved three-field system. It had a robust quantity of livestock and was improving from year to year. Of course, there were only improvements in the humus and thus in that part of the soil containing nitrogen, whereas the mineral content, which was not supplemented by means of artificial fertilizers, inevitably went down. Thus, an excess of nitrogen seemed to have accumulated in the soil, and this excess, as well as a shortage of nutrients, brought the former owner increasing straw harvests and decreasing grain harvests with each passing year. The current owner acquired the estate mainly to grow sugar beets and potatoes for his nearby sugar factory and distillery. From that point on, sugar beets were the main focus of the estate. As already mentioned at the beginning of these observations, 170 morgen of high-altitude land are not suitable for growing sugar beets, which leaves about 750 morgen for their cultivation. For these fields, the so-called Norfolk crop rotation was chosen, which in this case means:

- 1) winter grain,
- 2) sugar beets,
- 3) summer grain,
- 4) potatoes, peas, fodder beets, clover, maize.

Thus, except for the annual clover, the perennial fodder crops were banned from the rotation, and sainfoin was cultivated extensively at the higher elevations, thriving splendidly in the clayey limestone soil. Given the great distance of these fields from the farmyard, a more extended farming operation also seemed desirable for cultivating fodder there. The sainfoin grows there for 3 to 4 years in a row and is reseeded after 6 to 8 years of cultivating rapeseed, wheat, potatoes, oats, peas, and lentils under oats. A specific crop rotation could not be determined for these fields because the disparate composition of the individual sections did not allow them to be forced into a crop rotation.

Before we move on to further considerations, namely, to a discussion of the livestock, it should be noted here that the farm delivers the harvest from approximately 180 morgen of sugar beets and 70 to 80 morgen of potatoes to the aforementioned sugar factory and distillery. The not insignificant distance to these factories means that each beet or potato delivery, and sometimes the return of pressing residues, nearly always costs a full day all winter long. The estate receives 11½ groschen per hundredweight of beets from the factory and 16 thalers on average for 24 hundredweight of potatoes; however, it pays the factory 5 groschen per hundredweight of residue from the beets (ca. 30% including heads with the maceration process); and for the mash obtained from the potatoes, 8 thalers per 4,000 quarts of stillage. [...]

Source: H. Thiel, "Beschreibung und Ertragsberechnung einer Zuckerrüben-Wirtschaft," *Landwirtschaftliche Jahrbücher* 3 (1874), pp. 29–32.

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