INTERNATIONAL PRODUCTIVITY COMPARISONS

Dr. James Fry
Managing Director,
LMC International, UK

In this paper, I present a number of comparisons of the technical efficiency of leading cane sugar producers, and add two leading beet sugar industries for the purposes of contrast. It seems logical to start the comparisons in the field, at the beginning of the sugar production chain, I will then proceed down the chain, to end with sugar processing.

The countries which I have chosen to illustrate the productivity comparisons are:
Cane: Australia, (Centre/South) Brazil, China, Colombia, India, Mexico, South Africa, Thailand and the United States; and
Beet: The European Union and the United States.

These comparisons are not intended simply to show how producers compare today. It is also important to appreciate how much improvement different countries have made over time. Accordingly, where possible, the data stretch back to the second half of the 1960s and extend right up to the first half of the 1990s. However, in some cases, it has been difficult to obtain comprehensive data stretching that far back, and therefore I present a shorter run of data for a few countries in this paper.

Performance in the Field

Yields in the Field

A familiar point of comparison is to contrast yields of cane (or beet) in the field, as is done in Diagrams 1 and 2. In Diagram 1, and in the odd numbered diagrams which follow, I focus upon cane producers in Africa (represented by South Africa), Asia (China, India and Thailand) and Oceania (Australia). The even numbered diagrams include a sample of major cane producers in the Americas (Centre/South Brazil, Colombia, Mexico and the US), as well as the beet industries of the EU and the US.

Most of the commonly quoted measures of yield are expressed in terms of tons per hectare, but this inevitably introduces a bias in favour of those producers which have a long gap between harvests. In terms of the countries considered in this paper, the conventional measure of yields favours South Africa, India (where Maharashtra has its 18 month, crops) and the US (with Hawaii’s 24 month cycle).

To correct for such biases, we have prepared Diagrams 1 and 2 on the basis of tons of cane or beet per hectare per annum. The outstanding performance is that of Colombia, with the benefit of irrigation in the near ideal circumstances of the Cauca Valley. Behind Colombia lie Australia and, closing fast on it, India. The only three countries with yields of under 50 tons per hectare per annum are South Africa, Thailand and US beet. Despite their low yields, these three producers have notched up positive production growth rates (and very high growth rates in the case of Thailand) over the past few decades, which suggests that low field yields are not necessarily a barrier to competitive sugar industries. Diagrams 3 and 4 depict the average annual growth rates from the late 1960s to early 1990s.

The diagrams reveal that the greatest progress in improving yields occurred in India and the EU beet industry. Meanwhile South Africa, Thailand and the US cane industry have all experienced declining average yields in the field. Once again, it proves surprisingly difficult to arrive at an unambiguous rule of thumb about the pre-conditions for production success. Thailand’s rapid expansion as a sugar producer has happened in spite of poor, and deteriorating, yields in the field.
Diagram 1: Yields of Cane per Hectare per Annum — Asia, Oceania and Africa

Diagram 2: Yields of Cane or Beet per Hectare per Annum — The Americas (for Cane) and the EU and US (for Beet)
Diagram 3: Average Annual Sugar Output Growth, Late 1960s to Early 1990s — Asia, Oceania and Africa

Diagram 4: Average Annual Sugar Output Growth, Late 1960s to Early 1990s — The Americas (for Cane) and the EU and US (for Beet)

The Sucrose Content of Sugar Crops
The next pair of diagrams depicts the trends in the sucrose content of the cane or beet delivered to the factory. The two beet industries have far richer raw materials than any of the cane producers, apart from Australia.
Generally speaking, the sucrose content of cane or beet has increased over time, but whereas the beet industry as a whole has seen the sugar content of crops rising fairly steadily, the situation has been different within the cane sector.

It would appear that the cane industries with the richest crops (Australia, Centre/South Brazil and South Africa) have failed to increase their sucrose contents, leaving the gains concentrated among the countries whose performance lagged behind them in the past. In other words, the cane industry, unlike beet producers, has been characterised by “catching up” rather than a general advance.

This contrast between the cane and beet industries may not be coincidental, but may have its origins in a fundamental difference in the ways in which varietal improvements are achieved. In the beet sector, the production and sale of seeds is a valuable business, and one in which leading agricultural chemical and biotechnology companies are now investing heavily. Therefore, the profitability of seed production acts as a spur to the development of new varieties.

As many of those at this Congress will know only too well, the sugar cane sector itself has to fund the vast majority of investment in new varieties. This calls for a large degree of altruism, since everyone is aware that “free riders” exist throughout the cane world, waiting for others to breed improved varieties, and then stealing one or two sticks of cane for their own use.

The difference in the motivation for research undoubtedly spills over into amount of resources devoted to the development of new varieties. The challenge for the cane sector is to harness the profit mechanism for its own research stations. If it were possible, using genetic markers, for example, to work out means of identifying new cane varieties and of imposing royalties upon every ton crushed at a mill, then the problems of funding research would probably disappear overnight.

![Diagram 5: Sucrose Content of Cane — Asia, Oceania and Africa](image-url)
Yields of Sucrose per Hectare

The data on the yields of sugar crops are combined with the information about the richness of these crops to generate Diagrams 7 and 8, which reveal the success of typical cane or beet farmers in each of the countries under review in producing more sucrose from each hectare of their land. It should be noted that these two diagrams take no account of the performance of factories in recovering this sugar from their raw materials.

The results which emerge are not particularly flattering to the cane sector. Unlike the beet industry, which has increased significantly the amount of sucrose obtained per hectare, most cane industries have not managed to raise their sucrose yields much above the levels of the late 1960s.

Some of the reasons for this disappointing outcome are to be found in the different motivations for research funding, as explained above, but it should not be forgotten that economic pressures for cost reductions may reduce yields in the field. For example, greater mechanisation of harvesting may reduce costs, but may also hit yields and cane quality. Extending the milling season to cut the unit fixed costs of processing will tend to lower the average Pol of cane over the season as a whole. Shifts in the regional balance of production may be a further factor: the decline in Hawaiian output within the US total has forced down the average sucrose yield in the country.
Diagram 7: Sucrose Yield per Hectare per Annum — Asia, Oceania and Africa

Diagram 8: Sucrose Yield per Hectare per Annum — The Americas (for Cane) and the EU and US (for Beet)