

A Processing Executive Looks at the Future of the Beet Sugar Industry¹

ROWLAND M. CANNON²

With the future of the beet sugar industry that has been spoken for by the beet grower and by the agricultural executive, I am not at all sure that there is anything left for processing the crop, but if there is to be something for processing the crop and after that for selling it and for taking care of general management needs like paying interest on borrowed money, paying taxes, and paying dividends to the owners of the business as a return on their investment, it must come through improved efficiency.

Our business is one of those in which the prices of finished products definitely have not kept pace with inflation. Besides that, such increases as we have had in the prices of sugar and by-products have not been used in processing the crop but have accrued to the benefit of other phases of the business. This means that the successful beet sugar processor has had to maintain or reduce his costs of processing the crop over a long period of time.

A careful look forward seems to suggest that in the future we cannot expect sugar prices to increase as fast as the general cost of living. It further suggests that the prudent processor must continue to find ways to offset the increases he is bound to face in unit material and labor costs. So perhaps the single most important prospect for the future facing the processing executive is that he cannot permit his total costs of processing to increase with rising costs of labor and material that he uses.

To meet this challenge, processing efficiency must be continually and dramatically improved.

In the years since World War II, and I suppose for some time before the war, increased factory capacities have probably contributed more to improved processing efficiency than any other single factor. These increases have not only resulted from higher slicing rates, but from longer campaigns, and have involved such innovations as staggered cropping systems, improved techniques for storing beets and the use of juice storage. Significant gains have been made in other ways also. Important among them are the use of automation techniques to reduce

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² Executive Vice President, Utah-Idaho Sugar Company, Salt Lake City, Utah.

labor requirements, reductions in fuel requirements from more efficient generation and use of steam, reduced consumption of lime rock and other operating supplies and improved efficiency in maintaining processing facilities resulting from both better equipment design and maintenance techniques.

During this period we have had little or no improvement in rate of extraction, or sugar recovery from the beets sliced. In fact, many processors have been faced with a decreasing recovery of sugar over the past 15 to 20 years. Even though there has been improvement in purification systems and other processing techniques, they have been more than offset by declining beet purity and sugar content.

As we look to the future it seems pretty evident that major improvements in efficiency must come in quite different ways than they have during the past 20 years. For example, while factories will certainly be enlarged further, we are not likely to see a continuation of the dramatic increases in factory capacities of the past 20 years, and this will perhaps be a less important means of maintaining low processing costs than it has been in the past. And yet it will be extremely important in some areas.

Since it seems so evident that improved efficiency is the name of the game for the future, some analysis of ways and means for needed improvements should be significant. My crystal ball isn't much good and I don't use it well. Yet there are so many obvious areas for improvement—some proven and some yet to be worked out—that they must be reviewed.

This review will not be made just for the benefit of the process technicians in this audience. One of the real challenges for the future is for the industry to become less compartmentalized, for each of us to gain a better understanding of the problems of the industry, to see them in broader perspective, and to develop more comprehensive solutions to them. Too often we tend to solve problems by transferring them into someone else's area of responsibility, and these are not the kind of solutions we need. So I hope that my remarks will contain something for everyone in attendance.

It seems to me that the broad approach is extremely important for the younger people in the industry today. As time goes on you will be dealing with larger and more complex problems. Factories will be bigger. Processing will be more precise. Volume requirements will be higher. Facilities will be much more expensive. In your game the stakes will be higher and the returns will depend on things being exactly right. But you will have better knowledge and information, better tools, and better facilities to work with. Many of the old hands don't understand

the approaches you have been taught to use. To make the best use of your modern approaches you must have a clear and comprehensive knowledge of the problems you are dealing with. If your analysis is based on misinformation or if it ignores basic facts, it isn't much good.

Now, as a processing executive looking to the future of the industry, let's head our list of needs with "better recovery of the sugar in the beets." For the industry in the United States as a whole, perhaps 86 or 87 percent of the sugar entering the factory ends up in the bag. If we back up a step, we would find that the recovery expressed as a percentage of the sugar delivered by the grower to the processor is lower—maybe only 82 or 83 percent recovery on the average. A loss of 13 or 14 percent of the sugar entering the factory, or 17 or 18 percent of the sugar delivered by the grower is a lot of sugar and we must find ways to reduce it. Many of the papers delivered in this convention touch upon things related to this problem, as have many papers delivered in past meetings. Our efforts in growing the crop, harvesting and receiving it, storing it and processing it must all be intensively directed toward achieving better extraction.

In Europe great strides have been made toward better recovery of sugar from the beets. One of the most important developments has come in the field through achieving material improvement in the quality of the beets. Process technicians from this country are always envious of the high sugar content and high purity of beets they see being processed in European factories. When measured in terms of our technology the quality of the sugar beets processed in Western Europe must certainly be worth two or three or four extra percentage points of extraction recovery as compared to the beets normally processed in this country. It is important that all of us connected with the industry—grower, agricultural technician and process technician alike—have a full understanding of the importance of high purity and high sugar content to efficient processing operations.

Losses in the handling and storage of the beet crop before it is processed are important. Climatic conditions vary widely over the country, and certainly the problem of sugar losses between receiving and processing the crop is vastly different in The Imperial Valley of California or this beautiful valley we are meeting in (Salt River Valley of Arizona), where harvest and storage temperatures are often above 100 degrees, than they are in The Red River Valley or in Montana where harvest temperatures are commonly below zero. And in some of the

other areas where alternate periods of heavy freezing and warm thawing temperatures are common during the storage period the problem is again quite a different one. Under all of these conditions sugar is being lost between the harvest and the time the crop is processed. Our interest must go beyond merely delivering sound beets to the factory for processing, and must carefully consider any changes in sugar content and purity that occur. This problem is of vital importance to both the growers and the processors and in the long range the interests of both will certainly be better served through both parties going all out to effectively minimize these storage losses.

We all know that sugar losses in storage vary widely, sometimes reaching a total loss where beets have deteriorated so badly that they are not worth processing. As a rule of thumb this wide magnitude of storage losses is sometimes evaluated as one-half pound of sugar per ton of beets per day of storage. This loss may show up in more than one way—a loss of weight of the beets, a loss of sugar content of the beets, or a combination of the two. In any case, it amounts to big money. For a typical factory located in a northern area of the country with a typical campaign the sugar that is lost between harvest and processing might have a market value of something like one-half million dollars if it could all be recovered in the form of refined sugar.

Factory losses have received lots of attention over a long period of time, and yet there remains much opportunity for improvement. For the average factory referred to earlier, if the sugar lost in molasses, pulp, lime sewer and other factory losses could all be recovered in the form of refined sugar, it would have a market value approaching two million dollars. Of course, if it were to cost something over two million dollars to recover this sugar, it would be no bargain, and this is the reason these losses are as big as they now are. But here is a great opportunity for improved techniques. And whether it be through the application of ion exchange, better carbonation, more precise sugar boiling, further application of Steffens process, or procedures and techniques not yet conceived, we must, and we will, find ways to achieve a higher recovery of sugar from the beets we buy.

In recognizing that both the sugar beet grower and the beet sugar processor need more money to meet future pressures, it seems fairly obvious that it cannot all come from the market place. It must then come from the only other places available, namely the production of more sugar per acre on the farm and the recovery of more of the sugar that is in the beets in the processing operation.

Our business is a seasonal business and with it come all of

the problems of seasonal workers. Great strides have been made in many factories both in Europe and this country toward reducing labor requirements through automation. With automation comes more precise process control, and this leads to more efficient operations. While the technology of automated process control is rapidly being worked out, its widespread application remains far behind. The future demands that we move ahead rapidly toward complete automation of our processing operations.

As process automation is achieved, it will undoubtedly be guided by automated decision making. I suppose that within the industry computers are now being used extensively to determine the most efficient level of operation for a given set of conditions, but this is an area where great strides will certainly be made in future years. And the change from operating control by instinct to computerized operating control will eventually result in further operating efficiencies.

The future is bound to bring further consolidation of processing operations and further enlargement of factories. This may take a different form than it has in the past. The very successful use of thick juice storage pioneered by the Holly people seems certain to find greater use in the future and be a part of the expansion of many factories. We may see factories in the future where the sugar end is in operation most of the year, and this will certainly change many of the concepts of sugar handling and sugar storage.

As juice storage is expanded and some factories become more intensive refining centers, other factories may become satellites to them. The Tirlemont people in Belgium have developed this concept to the point that in order to make the best use of factory facilities they make raw sugar in some beet factories, while in others they are utilizing their sugar end equipment for white and high raw sugar. The raw sugar from some factories and the high raw machine syrup from others are then being transported to their refinery at Tirlemont. The possibilities of combining thick juice storage with the Tirlemont concept seem unlimited and they are certainly intriguing.

The highest cost operating materials, exclusive of sugar beets, are fuel and lime rock, and there seems to be opportunity for improving cost of both of them for many factories. We have the know-how to operate with much better fuel economy than is being accomplished in many factories. The guidelines for improving fuel economy are pretty clear cut. The facilities required cost a lot of money and the problem is one of achieving a satisfactory return on the investment required. This obviously

is affected by the volume handled by the factory, the stability of the volume, and other such pertinent factors. Factories of the future must have extremely efficient steam generators and heat consumption for maximum fuel economy.

There are now, two or three factories in the country equipped to reburn waste lime. I think that all of them are located in California where limerock is very expensive. While the cost of such facilities is very high, they must certainly be producing significant economies. The cost of such facilities seems to make them less attractive in most areas of the country where limerock is cheaper. It seems like an unnecessary waste to continually pay the cost of quarrying and transporting new limerock to our factories and at the same time to find suitable places to dispose of waste lime when it is theoretically possible to reburn at least a large part of the lime we are discarding. The beet sugar factories in the United States probably use something like one million tons of limerock annually. I suppose that the average mine cost of this rock is at least \$2.50 per ton and the cost of transporting it from the quarry to the sugar factory ranges up to as much as \$4.00 or \$5.00 per ton depending on the distance involved. The industry must be spending something like \$5 million annually for limerock laid in at the factories. The need for lower cost methods of reburning waste lime are great and such development seems almost certain in the future.

The cost of maintaining our factories is a major expenditure. Modern equipment and modern design often require less maintenance than those of former times, but maintenance procedures are often more precise and difficult, requiring more skilled technicians. In the future there will be increased emphasis toward maintenance-free equipment and design arrangements. It seems certain that we will use maintenance schedules that permit maximum use of equipment between overhauls, with maintenance schedules for some of the equipment perhaps following cycles that are different from normal inter-campaign periods.

In the framework of the traditional relationship between processors and growers there are several places in the operation where efficiency can be improved to the benefit of both the growers and processors. Reference has been made to beet storage as being in this category. Sugar packaging, handling and storage is another area where both parties are affected. Mechanization and automation of these operations offers considerable opportunity for savings but also involves substantial capital outlay. Thick juice storage facilities likewise are beneficial to both parties. The savings, that can be made from such improvements,

are so great that the interests of the individual parties must be coordinated to achieve maximum overall efficiency.

This review of ways and means, that might be used in the future to improve the efficiency of processing operations in the industry, is by no means exhaustive, nor is it intended to be. I do hope, however, that it has stimulated the idea that we have many opportunities for continued improvement in processing operations and many paths to explore for the purpose of maintaining processing costs at levels lower than would result from normal inflationary pressures.

It is certainly obvious by now that we have not discussed one very important item in connection with these points, and that is how much money it is going to cost to make such improvements and where the money is going to come from. The capital cost of many of the improved techniques discussed here is extremely high. One of my early experiences with my company --shortly after I was out of college --was on the design and construction of a new factory. It was modern and efficient with a slicing capacity of about 1500 tons per day, and I well remember that it cost about a million dollars. That is a far cry from the \$20 to \$30 million dollars that a new factory costs today. The cost of modernizing old factories has likewise increased a great deal. In some cases it almost involves the erection of new modern facilities along side the old.

If such ventures are to be made there must be an adequate return on the money invested to justify it. And there is little room for mistakes, because at present costs, mistakes are much more expensive than in former times. This means that procedures to be used must be well conceived and demonstrated and planning must be sound. Today's costs, and more particularly, those of tomorrow, leave no room for trial and error procedures.

Other requirements are equally important. The high cost beet sugar factory must have adequate volume to justify it, and this volume must be consistent to maintain it. Success in the future demands that the total industry --growing the crop, processing it and marketing it --operate at maximum efficiency, and one of the most important factors to this is volume. Inadequate and erratic volume does extensive and irreparable damage to the industry as a whole and everyone who is a part of it.

If we are to move forward in a positive and aggressive way we must all have full confidence in the future and the things it holds for us. We have all seen the detrimental effects of lack of confidence. We have seen growers who have not modernized their equipment, facilities and production methods because of

a lack of confidence in the future, and very often this is the beginning of the end, because their very lack of moving ahead compounds the troubles that have undermined their confidence to begin with. We have seen processors who have not modernized their factories and facilities because of their lack of confidence in the future of a particular operation and this too is very often the beginning of the end. And we have seen areas that were down, where both the growers and the processors were discouraged, and new stimulations and new points of view have brought about a reawakening. New enthusiasm has developed, and suddenly their venture has developed new prosperity for growers and processors alike. This is a business where the participants—both growers and processors—rise together or fall together.

So as we look forward to the future of this business, we have much to be enthusiastic about. We have many challenges and we have many opportunities for success. But most of all we have in groups like this one assembled here this week the technical abilities and the determination to evaluate and find solutions to our problems, and to find new and better ways to do things, and we have people in the industry—growers and processors alike—who are willing and determined to evaluate new methods and confidently put them to practical use to make a better future for all of us.
