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The UPCA Food Science Pilot Plant

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Food technology involves all aspects of handling, processing, storage, and distribution of foods following harvest. In order to fulfill its obligations to society, a College of Agriculture must train people and carry out research to improve the supply of and quality of food for the consumers.

Although some governmental laboratories and other colleges may teach and do some research in food science and technology, generally only a college of agriculture has a ready supply of agricultural products which can be grown and harvested under controlled conditions and delivered quickly for processing studies. Thus, the College of Agriculture is the logical location for a Department of Food Science and Technology. It is for this reason that a committee on food science and technology^{1/} recommended February 5, 1964, that such a department of Food Science and Technology be established at the University of the Philippines College of Agriculture.

An integral part of a department of food science and technology is a food processing pilot plant.

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The UPCA Food Science Pilot Plant received its start when U.S. AID (United State Agency for International Development) signed a contract with Cornell University (csd-1815) July 1, 1967 for a project entitled: Development of soy-based foods of high nutritive value for use in the Philippines. The original amount of the contract was \$411,000 covering a period of three years. Original project leaders on the project were Dr. D. B. Hand, Director, and Dr. Keith H. Steinkraus, Associate Director, both of the Dept. of Food Science and Technology, Cornell University Geneva, New York. The project stated: "Pilot plant studies in the Philippines will be an important part of this work. Quoting further "A pilot plant line will be established at the College of Agriculture of the University of the Philippines in order to study the adaptation of the results obtained in the Cornell laboratory to local Philippine conditions." Qualified Filipino personnel will be employed on the project at Cornell to provide them with practical training and experience in soy technology to enable them to carry on work in this area at the University of the Philippines after this project has ended".

The contract specified purchase of pilot plant equipment costing approximately \$48,000 and the sum of \$2,000 was set aside for renovation of space for a pilot plant. The following pieces of equipment were listed:

Proctor Schwarz Circulating hot air dryer
Bauer Laboratory refiner (grinder)
Fitzpatrick comminuting mill
Manton Gaulin homogenizer
Rietz Disintegrator
Hobart Mixer
Berlin-Chapman agitating retort
Moyno Pump
Shriver filter press
Waukesha Pump
Lee Steam kettle
Dixie retort

In addition it was necessary to purchase and install a steam boiler, water softener, water heater, and air compressor to supply the needs of the pilot plant. These were items not originally considered in the budget.

Thus far, the following equipment has been purchased and installed (up to May, 1969): Steam boiler, water softener, water heater, air compressor, Lee steam kettle, Dixie retort, Rietz Disintegrator, Shriver filter press, Moyno pump, Manton-Gaulin homogenizer. On order are the Proctor Schwarz dryer and the Fitzpatrick mill.

Although ground for a new Food Science Building and Pilot Plant has been broken in May 1969, on the campus of the U.P.C.A., it was recognized earlier that such a build-

ing and pilot plant would not be completed before June 1970. Therefore, the decision was made to renovate the back third of the main chemistry lecture hall for a pilot plant. This provided an area of about 100 square meters. It was also necessary to construct an addition to the Chemistry building to house the power equipment. This was completed with installation of three phase electricity about December 1968. Expenses incurred in these constructions and renovations were all charged to the project.

The pilot plant is equipped primarily for the extraction of vegetable protein milks such as coconut, soy and nut. The bottled products are then sterilized in the retort. However, the pilot plant can easily be adapted for the processing of other vegetable and fruit juices or any food in liquid form.

When the circulating hot air dryer, which has both temperature and humidity controls, arrives, it will open up the whole field of dehydration of fruits and vegetable and the production of quick-cooking or "instant" cereals and other products.

Although the pilot plant is presently located in the Chemistry building, it is available to all those on campus who wish to do research in which the above types of equipment are useful.

So far, one member of the staff, Mr. Jesus Melgar, a holder of the B.S. in Sugar Technology degree has

completed not only his M.S. degree in Food Science at Cornell but has been given 6 months special training in pilot plant operation and management in the Pilot Plant of the Dept. of Food Science and Technology, Cornell University, Geneva, New York. He has returned to the Philippines and is currently Pilot Plant Manager. At the present time, Mr. Crispin Capareda, also a BSST graduate is at Cornell undergoing similar training. He will be returning to U.P.C.A. in September, 1969. With these two men, it is envisioned that further expansion of the food pilot plant will occur and that it will become the backbone of the program in food science and technology at Los Baños. It is not possible to have everyone operate these highly complicated and expensive machinery. Thus, the pilot plant manager takes full responsibility for operating the equipment in various experiments.. He, in turn, has trained one man and will train others to help him in operating the equipment.

When the New Food Science Building and Pilot Plant is completed on the U.P.C.A. campus, the equipment in the present temporary pilot plant will be transferred to the new building where it will continue to be used for teaching, research and extension. Not only can this equipment be used for research it can be used to demonstrate to the food industry how to process new products on a less-than-commercial scale. It also will prove to be very useful

when the researcher wishes to scale-up his operation from that used in the laboratory. As one increases the size of the operation, problems generally arise and solving them at the pilot plant stage can save industry many problems and also much money. To give an idea of the equipment and the layout of the Pilot Plant, several pictures are shown in this article. It is to be especially noted that most equipment is not bolted permanently to the floor; the machines are free to move on rollers. This arrangement makes for flexibility in teaching and research. The equipment necessary for a given process, may be assembled easily, anytime, to constitute a "production line". The problems of how to have the needed steam, electricity, compressed air, running water etc. supplied to the equipment, is solved by flexible connections as shown in the pictures.

Food science and technology has three broad areas: food chemistry, food microbiology and food engineering. Food chemistry was the center of attention for many years past, at UPCA. Food microbiology, in the last few years has been upgraded and developed with new laboratories and equipment. With the setting up of the food pilot plant, food engineering now completes the coverage of food science and technology. The courses in food processing (FS 237 and 238), Thermal processing (FS 217) and Dehydration and freezing (FS 218) will now benefit by actual pilot plant work.

In the past, the UPCA has had great success in manpower training for the sugar industry. This success is ascribed to a large extent to the actual training in a pilot sugar mill located in the campus. There is every reason to expect that the new UPCA Food Pilot Plant will do for the food industries, what the pilot sugar mill did for the sugar industry.

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