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A HISTORY OF INDIVIDUALLY WRAPPED PROCESS CHEESE SLICES

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The following paper was presented by Mr. Arnold Nawrocki, Quality Assurance Manager, Pauly Cheese Company, Division Swift & Company, Box 1467, Green Bay, Wisconsin 54305, USA, especially for the 1st Biennial Marschall International Cheese Conference, held in the Coliseum of the Dane County Exposition Center, Madison, Wisconsin, on September 10, 11, 12, 13 or 14, 1979.

Imagine, if you will, all present packers of individually wrapped slices (IWS) being ordered to cease and desist in the use of mold inhibitors, and then getting the news that K-film*, Mylar*, coated polypropylene, and all co-extruded films would have to undergo safeness tests that would not be completed for periods of 3 to 10 years.

Now to really stretch your imagination. Assume no IWS machinery and no housewife who has even seen a slice of process cheese in its own wrapper.

As far as process cheese products are concerned, we are now back to the conditions that prevailed in the U.S. and I daresay, the world, 30 years ago.

In the late 40's, there were a number of cheese processors selling a large volume of five pound loaf for use in either direct retail outlets or for slicing operations that sliced and packaged for retail outlets.

This calm world was upset by the explosive force of a wonderful idea—Kraft deluxe slices. These were process cheese formed and packaged in one continuous operation from hot cheese to an item that looked like slices. Apparently the consumer neither knew nor cared that these so-called slices were not actually sliced off a loaf. Once past this hurdle, the next step was to compete economically against the system of slicing off a loaf and packaging. This was rather easy but mold problems made for interesting research. These problems gave the processors some breathing room in their battle to retain their business while developing a system of their own.

Various processes of casting cheese into large shapes that were cut into loaves, sliced, and packaged were tried. These methods had twin problems - mold and separation of slices. One way to stop separation problems was to interleave the

slices, overwrap, and evacuate the package to suppress mold growth. At this time, CO₂ packaging came on the scene to inhibit molding by aiding vacuum. (1)

In our lab at this time we had a small drum dryer for roller drying skim milk and a small 5# process cheese cooker. The drum dryer became a Chill Roll for experimentation. Initial tests were along the line of putting pliofilm between slices. By running pliofilm over one roll and casting hot cheese between the nip of the rolls, we extruded a sheet of cheese on the pliofilm. Cutting all this into slice size was a problem and, therefore, abandoned. The next test was the result of that light that flashes when a hot idea enters one's mind.

If I could cast a hot product between two sheets, seal and cool, I'd have an individually wrapped slice that would have excellent keeping qualities.

Using a roll of wax-coated cellophane on either side of the hot cheese and between the nip of the rolls (no cooling medium was used), we obtained a nice sheet of cheese. We laid this sheet flat on a long table top and I used a narrow (1/4") roller to form slices. The roller pushed the still hot cheese aside and each sheet of wax-coated cellophane contacted the other and sealed! After a little cooling, I used scissors to cut the slices apart and formed a stack of individually wrapped slices. They were beautiful and expensive. Expensive because of the cost of wax-coated film. The slices were extremely difficult to get into, and there was a tendency to leave wax on the cheese.

Obviously, a cheaper film had to be used. Since pliofilm had, to our mind, some shortcomings, we tried cellophane. It was cheap and plentiful. The heat of the cheese immediately wrinkled the film. There seemed to be no other film options so I was at the end of the rope and the project was killed. The individually wrapped concept had not gained a single convert!

In 1951, my path crossed that of William D. Tate of Clearfield Cheese Company. This man and his brother, J. Hamer Tate, are, to my mind, the true patron saints of individually wrapped process cheese slices. Their belief in them, their support and encouragement made our IWS a success. I became Technical Director of this company.

In late 1952, it became apparent that Clearfield needed some kind of sliced product. I resurrected the concept of a single wrapped slice. My demonstration equipment consisted of a section of roller conveyor with two rollers mounted 1/8" apart. We used solder to make squares on each roller that matched up as dies when the rollers were rotated inwardly. Again two sheets of wax-coated cellophane were fed between the rollers and hot cheese poured between the sheets, the rollers rotated, and square packets of cheese 1/8" thick were formed. This time two important converts were made—the Tates. They became enthusiastic as to the possibilities.

The discussion of economics immediately eliminated wax-coated cellophane. This time we were aware of a new type of film being researched by DuPont—a polymer-coated cellophane.

We felt that a horizontal unit using a nozzle to feed the hot cheese into a tube formed by sealing two films around the nozzle would be more convenient for easy access to the operating parts.

We envisioned a slice with a four-sided seal with open ends beyond the seals for opening purposes. The sealed slices would simply be banded for sale.

We were enthused—no mold problems since, after all, we had a hot fill. We soon found the bumps in the road. Not many machine builders were interested in designing a machine—especially since we rejected one firm's idea of 12 slices a minute on an intermittent basis. We finally located one.

We didn't know the speeds available, but we wanted it "fast", continuous, with some kind of weight control and speed to be adjustable to the sealing speed of two sheets of film.

Our first unit had glaring problems. We did not know how to extrude hot cheese, our cooling was inadequate, and we had no positive drive of film through the system.

We solved our cheese pumping with a Moyno pump. We came up with a positive drive for the film and later found it had been patented in 1928.

So we now had hot cheese pumped by a Moyno pump through a flat nozzle. Two 4" wide films fed from top and bottom were sealed together on either side of the nozzle prior to the nozzle opening. After the cheese was extruded into the film, it went through flattening rolls that rolled the cheese to an approximate 1/8" thickness. Our positive drive units consisted of traveling, mating press outs that "grabbed" the 1/8" sheet of cheese and pressed 1/2" of cheese out of every 4 inches. Sealing units that were also traveling mating units with a cutoff mechanism between the seals then sealed the individual packs of cheese and cut them into individual units.

The sealing of the films around the nozzle was painfully slow and the end seals were impossible to make through the cheese residue. To solve the side seal, we adopted a procedure similar to a Campbell Wrap Machine, where one film was used and wrapped around the product. In this case, we brought the film up from the bottom and wrapped it around the nozzle. Our limiting factor became the end seal.

After unsuccessfully trying many ways to seal, we made a major decision. We would not seal the film at any time. We wrapped it around the nozzle, extruded cheese into the tube, flattened the tube with rollers, pressed out the cheese to make slices, and then cut the individual units. The press out left a residue that keyed the films together much like a casein glue. The slice was easy to unwrap

(and became familiar to millions). Of course, we now opened ourselves up to mold problems. By this time, it was approaching 1956 and propionates were legal mold inhibitors.

We were using DuPont's 450K202* wide enough for a full overlap. Our extrusion unit was well past 200/mm. The slices were assembled into piles, overwrapped, cased, and cooled. The heat of the cheese destroyed the look of the cellophane, and they practically molded to each other. It was necessary to cool before assembling. We tried air, water, direct refrigerant expansion, and finally stainless steel belts cooled by brine. A line of single slices was deposited on the belts and assembled after cooling. The belts were made wide enough to accommodate a double row of slices from each extruding unit because our tests showed we could extrude over 600 per minute. However, it was many years before we successfully divided one fast line of slices into two for cooling on these belts.

Our first successful run of individually wrapped slices was sold to a PX in Germany in 1956. Since our slices were not sealed, we had given up the idea of a band and had gone to an overwrap. We used the same cellophane in the overwrap as we did on the slices. This was a major innovation in itself since cheese at that time was packaged in wax-coated cellophane and an all-cellophane package was seemingly a gamble. In the PX order, we used propionate in half the order and none in the other half.

Clearfield salesmen were introducing this sensational new item but find resistance. Buyers for chains wanted to know how much extra they were paying for all that packaging. The salesmen patiently explained the economics of cheap cellophane versus all the heavy wax-coated expensive films around and besides our wrapper proudly proclaimed "Individually Wrapped" in bold letters. It was reported that inevitably, upon opening the package, the statement "Hey, each one is wrapped" started the whole sales pitch again. Skeptics appeared everywhere but Mrs. Housewife was conducting a write-in campaign that really sustained us—she loved it!

One of our salesmen was really down-in-the-mouth when one of his customers reported mold problems (we still were not on propionates). The buyer for a chain in the Southeast told him to relax and to analyze what he had for the housewife and gave him a sales pitch on his own product.

I'd like to say that the sales force pushed the sales curve through the ceiling. Some did not believe in the item. Some were enthusiastic, sold it, and it didn't move. We changed the wrapper to read "Each Slice Wrapped" because we believed potential customers did not understand that each slice was indeed in its own wrapper.

In this day and age it is difficult to imagine that customers apparently did not know what "individually wrapped" meant, but our sales started to pick up immediately.

Back at the plant, we had our share of problems to overcome. The traveling cutter was getting fouled with cheese as the cutter went through the pressed out cheese and sometimes went out of synchronization and cut through cheese. A knife and anvil replaced the cutter and simplified the operation.

The rolls of cellophane were running out too fast and changing rolls lost time so our people designed a flying splicer.

The nozzles and various guides were worn out in a hurry by the film running over them. Special ceramic coatings just about cut the wear to zero.

The knife and anvil idea was great but they too couldn't take the pounding. We heat treated steel and made our own anvils and bias cut knives.

Anybody who manufactures IWS is familiar with the problem of reclaiming the reject slices. Our engineer designed an "unwrapper" that was fairly successful.

The full overlap we had was reduced in 1/4" increments until we had a small overlap in the center. This caused our slice to break in the center so our formulas were researched to give pliable product.

Cellophane was an interesting story. We cut costs by reducing the 140 (the old 450) gauge to 195, then to 210, and finally to 250. We had wrinkling, sticking, and delamination problems. Tremendous research was done at DuPont, where they were helpfully interested in the project from the very beginning. Despite the problems, polymer-coated cellophane was still the best available film and suddenly—for a short time—it was unavailable. So in the late '50s we tried an exotic film called Mylar*. At that time, it did not work out and our cellophane was again available. Eventually in the late '60s, we adopted the use of a coated Mylar* that performed admirably. Mylar* did not wrinkle and did not key into the cheese-giving excellent release.

In 1962, the Pennsylvania plant alone was approaching 10 million pounds of each slice wrapped. We were not aware of any competition in the U.S. nor of any apparent interest by competition. We thought we were quietly stealing the market. This glorious interlude lasted approximately 10 years or until a major competitor came out with a cold pack IWS. Various hot and cold methods have since appeared, but they were anti-climatic as far as we were concerned.

Since I have related what we considered to be a first in the industry—a hot fill method, I would be remiss in not relating the story of a kindred soul who almost gave us collective heart failure some time prior to our successful 1956.

There appeared on the market sometime in late 1955 or early 1956 packets of 8 individually wrapped process cheese slices that were accordion folded and packaged. Needless to say, we were chagrined and loudly berating ourselves for spending 3 years and getting beaten to the market. Inspection of the product showed it was a cold pack from Canada.

The Crescent Cheese Company of Montreal and a gentleman named Joseph Ditkowsky had a system (2) wherein they took loaves of process cheese, sliced off slices, deposited them on roll film in an infeed conveyor, deposited another web on top sandwiching the slice between two sheets of film. A heat sealing drum sealed each slice in its own pocket. The continuous ribbon was cut in strips of 8, accordinated, and overwrapped. Being a cold pack, he had to use a pressurized filtered room, ultra violet lights, and impeccable sanitation. Crescent reached a sale of 2 million pounds per year before converting to an extrusion system in 1969.

Our industry is entering another explosive period of change. Great possibilities for innovative products and processes exist. What will they be?

(1) U.S. Patent 2,753,268.

(2) Private Communications - Joseph Ditkowsky.

* DuPont Reg. U.S. Pat. and/or T.M. Off.