ELSEVIER

International Food and Agribusiness Management Review 3 (2000) 423–432

International Food and Agribusiness Management Review

Northland foods: planning the end☆ A decision case prepared by

Kent Olson*

Department of Applied Economics; University of Minnesota, 231 COB, 1994 Buford Ave., St. Paul, MN 55108-6038, USA

1. Introduction

"John, I'm worried about maintaining quality as we finish the pack," said Ron Brockway, field manager for the Northfield plant of Northland Foods, Inc.

"Me, too, Ron. We're already losing some seasonal workers who are heading home," responded John Meyers, the plant manager. "And I remember corporate yelling about over mature corn last year."

"Oh, yea! I don't want to give corporate any reason to keep bonuses and raises low again. They seem to remember the quality of the last week better than the quality of the whole pack. The problem is, John, I think we may have a similar situation this year. The daily tonnage at optimal maturity and quality is starting to decrease now. But if we wait to harvest the last fields at their best time, I'm worried we won't have the workers to do finish."

"I hear you. Let's look over the samples and hear what the others have to say at the meeting."

2. This year's pack at Northfield

John Meyers, Ron Brockway, and the rest of the management team at the Northfield, Minnesota, plant of Northland Foods, Inc. had a busy summer–as usual for a vegetable

---

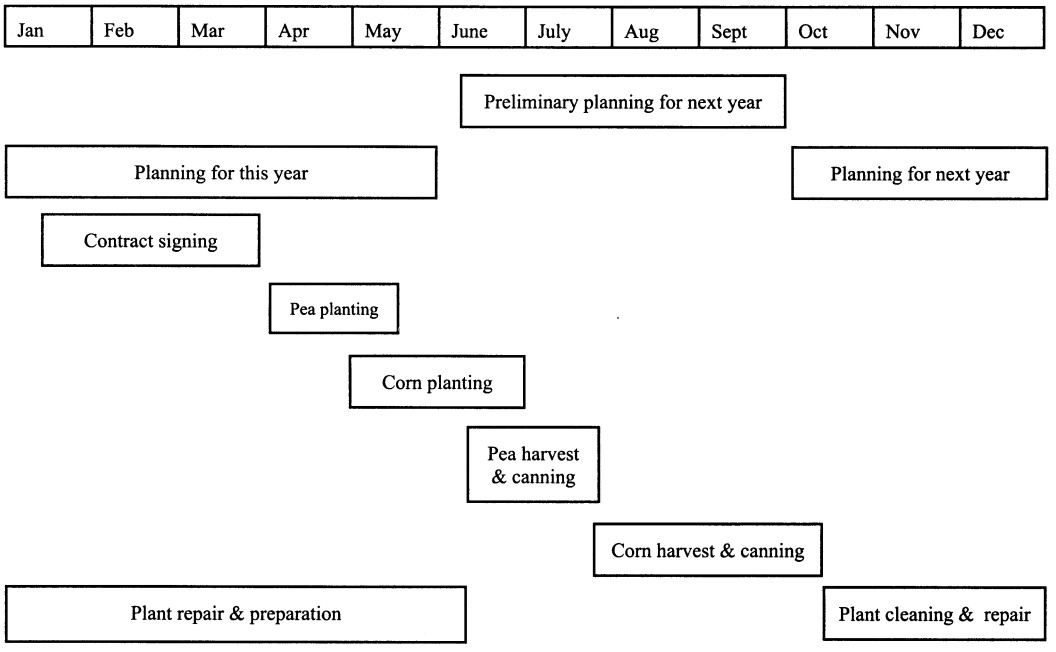
☆ This case was prepared as the basis for class discussion rather than to illustrate effective or ineffective handling of a management situation. The assistance of industry personnel is gratefully acknowledged for providing data and commentary for an authentic case. Personnel and proprietary names, however, have been disguised upon request to preserve confidentiality.

* Tel.: +1-612-625-7723

E-mail address: kolson@apec.umn.edu (K. Olson).

PII: S1096-7508(01)00058-1

Exhibit 1. The planning, production, and processing cycle at the Northfield plant.



processing plant. Last summer they had begun planning for this summer (Exhibit 1). Last fall, together with their corporate office, they had made the initial tonnage estimates for plant production and adjusted them throughout the winter. They had made acreage decisions and signed contracts with the farmers late last winter. The field crews had started planting peas in early spring; they had finished corn planting in late June. They had started pea harvest and canning in late June and finished in mid-July. They had started sweet corn harvest right after the peas were finished.

Field production and plant processing for both peas and corn had gone well this year. The Northland Foods plant at Northfield had some early weather related problems but no major problems. They had planted 18,018 acres of sweet corn, and through September 15, they had packed 106,065 tons of sweet corn (Exhibit 2).

At Northfield, the expected processing capacity for sweet corn was 137 tons per hour or 2740 tons per day when the plant was running at full capacity. A “full” day was two 10-hr production shifts and a three hour cleanup shift.

Throughout most of the harvest season, enough acreage was available to keep the plant operating at an efficient level with sufficient quantity and quality. As the harvest season came to an end, the acreage left to be harvested was smaller and the acreage ready to be harvested each day was decreasing.

Now, on Tuesday, September 16, they were within 8–10 days of finishing this year’s

Exhibit 2
This year's Sweet Corn Packs at Northfield compared to last year

	Last year	This year
Planned total tonnage	134,182	115,676
Acres planted	20,966	18,018
Expected yield (tons per acre)	6.4	6.42
Planned common cases[3]		
Fancy quality	5,789,000	4,929,000
Planned plant capacity		
Gross Tons per hour	137	137
Hours per day (2 shifts)	21	21
Line workers per shift	126	126
	(Season totals)	(Actual through 9/15/97)
Actual acres harvested	20,564	15,484
Passed acres	402	178
Actual tonnage harvested	143,948	106,065
Actual yield (tons per acre)	7.0	6.85
Actual common cases		
Fancy quality	6,741,100	4,375,065
Actual plant capacity		
Gross Tons per hour	133.6	150.0
Hours per day	20.1	18.0

[3] A common case is 24 cans with 15.25 oz. per "300" can.

"pack," that is, the harvesting and canning of the crop. They still need to maintain product quality and plant efficiency, but this was becoming more complicated due to decreasing corn to harvest and seasonal workers leaving as hours decrease.

The plant requires 126 workers per production shift and 82 for the cleanup shift. For both peas and corn and accounting for personnel turnover, the plant needed about 550 seasonal workers each year. This total counts only line workers not supervisory workers. Northland Foods promised regular plant workers at least six days per week with 10 hr per shift. If the plant was operating at full capacity, 11 hourly workers were needed in the fields for harvest; if conditions were wet for harvest, the number of field workers may be up to 40.

"Managing the plant becomes a balancing act at the end of the harvest," John Meyer explained to a visitor. "We need to balance plant operating efficiency and the quality of the harvested corn. To maintain plant efficiency, the number of workers needs to be high enough to run fully staffed shifts, and the speed of harvest needs to be high enough to keep the plant at or near capacity when it is running. But at the end of the pack as acreage and tonnage decrease, our options include decreasing the number of hours per shift, dropping from two shifts to one shift per day, harvesting a little earlier or later in the day for optimal physical quality, or even skipping a production day at the plant to allow the corn to mature to a better quality level. Another problem we have is that as the acreage left to harvest decreases, any weather problems keep us from harvesting at a rate fast enough to keep the plant at full capacity and still maintain quality. With fewer fields to choose from, we can get caught easier by weather. So one option is to decrease the speed of harvest to maintain raw product quality,

but that causes plant hours to decrease. So towards the end of September, we see many seasonal workers decide to head home as their hours decrease."

"This potential labor shortage is not trivial," Meyers pointed out. "Out of the 550 total workers in the plant, about 20–30 live in Minnesota permanently. The others come to Northfield, from Texas mainly, to work during the harvest season —roughly late June through late September or early October depending on the weather in a particular season. Since the plant may operate for only a few days in October, workers also want to leave before October 1 so they do not have to pay another month's rent but stay for only a few days. I don't like to see them go early, but I can especially understand the rent problem."

"These seasonal workers come north at the beginning of the harvest season and work many days and many hours. The Northfield area is their summer home but it is not what they think of as home —that is back in Texas. As the season comes to a close, they start to want to return home and, if work hours start to decrease, the monetary reason to stay and work starts to decrease. And, as many Southerners, they want to be in the sunbelt before the snowbelt gets too cold."

Another problem within the plant is that storage space for new cans is very limited at the end of the season. At the end of last year's pack, the warehouse is filled with canned product. As product was shipped out over the year, warehouse space had been filled with empty cans in preparation for this year's pack. Now in September, the warehouse is mostly filled with product again. The plant warehouse has room for only 2–3 truckloads of empty cans. The pole shed on the west side of the plant has storage space for a one-day supply of cans. So delivery time is crucial. The cans come from Wisconsin with a lead time of 1 day. At this time of year, delivery is fairly automatic; they call to cancel deliveries if the plant has problems. The warehouse manager figures they need from 100,000 to 110,000 cases per day at this time of year.

3. The morning planning meeting

Early every morning during the harvest season, the area field managers collected samples from each field of sweet corn they thought would be or might be ready in the next three to five days. This may be 25–35 fields or samples. For corn, the sample consisted of 15 ears randomly selected throughout the field. (Sometimes they took a larger sample in those fields where they were conducting a correlation test of conventional and new moisture and tenderness measures.) By midmorning, they brought the samples to the plant where they husked and laid the samples of ears from the least to most ripe on steel trays outside the building. The management team and several other employees would gather to evaluate the quality and maturity of the ears in the various samples. This gathering is also a good chance to discuss common concerns and issues with their colleagues – afterwards they would all head back to their own duties.

After reviewing the samples, the management team would move inside to the conference room. The agenda for the meeting is to plan the production and harvest schedule for the next few days and to discuss any other concerns and issues that may affect the operation of the plant. The meeting usually looks ahead one to two days specifically and five days in general.

In the middle of the season, this daily meeting is usually routine. They would discuss which fields were ready, which ones would be ready soon, the expected tonnage, the weather forecast, and so forth In midseason, the objective is to run the plant at full capacity. Poor harvest weather and plant shut downs may not allow the team to meet this objective. If the harvest schedule has been slowed and several fields are mature and approaching overmaturity, the discussion takes more time and the decisions are more involved. When these problems are not present, the team can quickly decide the field harvest order and keep the plant running well. Since they had experienced no major weather delays or plant operation problems during this year's harvest season, these morning meetings had been very routine. "Same-o', same-o'," said John the plant manager.

Today, September 16, a light drizzle is falling as the management team and several others gathered about 10:30. A few have raincoats on, but nobody has an umbrella. After reviewing the sweet corn samples, the management team moved inside to the conference room. Mr. John Meyers, plant manager, sat at the head of the table. Mr. Ron Brockway, field manager, and Ms Judy Lenertz, plant production supervisor sat in the two "hot seats" at Meyers's right and left. Mr. Dave Lanz, personnel manager, sat next to Mr. Brockway. Mr. Matthew Schommer, quality control manager; Mr. Steve Moberg, warehouse manager; several area field managers; and some other workers filled the rest of the table.

They know the end of the harvest season is near. The planning issues have changed. It's not the "same-o" agenda. Running the harvest crews and operating the plant take on a different tone in these last days of the pack. The team is concerned about keeping raw product and thus final product quality high, maintaining enough hours to keep workers interested, balancing the need for cans and other inputs with limited storage space, and keeping all the other areas of the system running well. Part of the seasonal workforce has left or will leave soon as hours start to decrease. Decisions become more complicated. Even though today's schedule was made at yesterday's morning planning meeting, they realize they may need to adjust the length of shift and ending times to balance quality and hours. If they were to work two full 10-hr shifts today, tomorrow's hours may be too short and workers would begin to leave. Then they may not have a sufficient number of workers in 2–3 days time.

Today's meeting starts normally; they spread a bag of munchies (cheese crisps, today) down the middle of the long, rectangular table in the conference room. The 5-day forecast of field acreage and tonnage by field (Exhibit 3) is passed around the table and the discussion quickly focused on the plant schedule: how many shifts today and tomorrow? Judy Lenertz, the production supervisor, begins by offering two options, "We could do either 20 hours today and one shift tomorrow or two shorter shifts today and two shifts tomorrow."

"We would need two cleanup shifts either way," noted John, the plant manager.

"How flexible is the availability of corn tonnage?" Judy asked Ron, the field manager. "Can I ask you to adjust harvest so I can adjust the plant schedule?"

After looking at the 5-day forecast again for a few seconds, Ron responded, "You can move any field up one day but no more."

"Will there be enough workers for two shifts next week?" asked Judy.

Dale, the workforce manager, answered, "We're starting to see some departures, but it is the day shift that is losing workers."

Exhibit 3
5 day forecast of fields, acreages, and tonnage ready for harvest

Name	Day date	Tue 9/16	Wed 9/17	Thurs 9/18	Fri 9/19	Sat 9/80
	arces					
Smith, J	51		410			
Wilson	48			315		
Rodenberg, E	40			300		
Rodenberg, F	42				300	
Wiles	62				465	
Anderson	80					315
Schimmel, G	105	570				
Peloquin, T	45		375			
Maier, D	40			245		
Cahill, S	40				290	
Campbell	52				335	
Hill	103					680
J. Johnson	60	400				
J. Johnson	44	370				
R. Holtan	68			615		
W. Gates	45		340			
C. Hubbard	70				495	
Odegard	55				345	
Brown	56					385
Fruedenberger, R	60	535				
Camp, B	55	245				
Larson 1	58			535		
Larson 2	58		535			
George, M	55		380			
Schultz	69				615	
Davis	53				410	
TOTALS		2120	2040	2010	3255	1380

Several people were surprised that the day shift is losing workers and interjected, “What?” “The day shift?” “Why isn’t the night shift losing workers?”

“We’re losing them to RC,” Dale answered. (Reinforced Concrete Products is a manufacturer of preformed concrete construction products also located in Northfield.)

Someone: “I thought RC was our friend.”

After some more discussion on this point of concern, Judy brought the meeting back to the decision, “Should we shut down at four today?”

“What are we getting, 155?” asked Ron. (He is asking about the actual processing rate of raw material, i.e., sweet corn, in the plant—expressed in gross tons per hour. See Exhibit 2 for a comparison of planned and actual plant capacity.)

“No, lately the average has been 147.8,” answered someone else at the end of the table.

Judy asked, “Should we run from 8 a.m.-4 p.m. and 6 p.m.-2 a.m. today?”

"How about running full today and a second shift tomorrow?" John asked, "To cleanup anyway."

"What's left to harvest?" asked Judy.

"Including the 5-day forecast, we have about 13,700 tons left out there yet," answered Ron.

"What if we run short today and had two 6's tomorrow?" John asked. "Would that help with keeping workers?"

"We can have enough," responded Dave.

"Two 6's tomorrow starting at noon?" asked Judy.

"What about the weather?" asked someone.

Someone else said, "Possible rain today, clearing off today with good weather tomorrow."

John, the plant manager, offered this idea, "Shall we have the pickers start at 10 tomorrow, the regulars in at 8? When should the sanitation crews work?"

Judy asked, "Should we pull up the Bonus Variety fields for Thursday? How much corn after Friday?"

Thinking of raw product maturity and quality, Ron suggested, "After this week, I think we should have one shift so we can leave some fields out there longer."

Dave added, "If people have to go, it's better to be on one shift."

Someone asked, "Have the college students left?" After some discussion, the group decided that only three were left so that is not a large labor supply to rely on this late in the season.

John centered the discussion, "In common cases, how much is left to run?"

Ron answered, "We have 2,350 acres left, counting what we've listed today on the forecast. That's 610,000 cases."

Judy said, "Let's just run it."

"What do we need for cans?" John asked Steve, the warehouse manager, at the other end of the table.

Continuing the plant schedule discussion, and ignoring the can question, Judy asked, "Do we give the workers the weekend off?"

Responding to the can supply questions, Steve, the warehouse manager, asked, "What will the plant schedule be? Then I can plan the delivery of cans. We have two million cans here now; that's enough for today. If we run another 610,000 cases, we'll need 75 truckloads. There isn't room to store that much so I have to keep a tight schedule on arrivals. I just don't want to run out."

"So it looks like the end of the season is next week: somewhere between Tuesday and Saturday," commented John. "What's the plan?"

4. Decisions

Before the meeting broke up, the team needed to make some decisions. How long should the plant run today and tomorrow? Will they continue to have enough workers? If they need to, when should they switch the plant to one shift? When do they estimate the pack be done? How many cans need to be ordered and when?

Appendix A. Sweet corn in Minnesota[1]

The vegetable processing industry had become well-established in the Upper Midwest by the 1950s, utilizing some 500,000 acres, and emphasizing the large-seeded crops such as peas, snap beans, lima beans and sweet corn. In recent years, sweet corn was grown on over 125,000 acres in Minnesota with a farm value of $50–60 million. Harvested at a point of rapid change in the plant growth and development process, a field of any of these crops could on one day provide an excellent product, and, two or three days later provide an overage product that might call for a much lower price, it if could be sold at all.

Not surprisingly, skilled management and careful attention to organization of the growing and processing operation were mandatory in a successful company. The industry consisted of a number of processing firms and their independent contract growers. Some of the firms were national or international in the scope of their production and packing operations and had many factory locations. Others were regional or local, consisting of one to several factory sites. At each site responsibility tended to be structured along two lines, that is, factory operations, and agricultural operations. Company success during the packing season was contingent upon the continuous flow of high quality raw product from the field to the factory.

Sweet corn for use as a canned or frozen product is grown on about 1600 farms in Minnesota. The average area devoted to sweet corn on each of these farms is about 40 acres, but may range from 20 to 200. Participating farms tend to be loosely clustered around 12 processing plants, although some may be as far away as 100 miles or more if the farm provides some special advantage in risk reduction, such as irrigation or a well-drained soil for early spring planting and, therefore, for an earlier harvest. Minnesota provides a good environment for sweet corn production–skilled farmers; rural towns with an available and cooperative summer labor pool; fertile soil; irrigation capability; long, sunny summer days with cool nights; and lower production and processing costs relative to the major U.S. vegetable production centers.

Sweet corn processing is labor and capital intensive, while production of the raw product is relatively less so. The processing companies specialize in processing, handling and marketing. Generally, they do not own farm land, preferring instead to invest in plant and equipment. The farmers, on the other hand, generally are not stockholders in the processing companies although there is currently interest in cooperative ventures in processing. Also, these farmers do not specialize in sweet corn production, or in the production of other vegetables. Instead, they usually are diversified crop producers and/or livestock producers. Their decision to grow sweet corn may rest on many factors and tends to be reconsidered each year. However, there has been a tendency for certain farmers to include sweet corn in their crop mix as a long-term enterprise.

A processing plant will have a limited time-span during which a crop can be packed during the summer. This is determined almost entirely by the growing season, but in some

[1]With the permission of David Davis, this section is adapted from the unpublished case, “Agricultural Manager’s Dilemma at Northland Foods, Inc,” by Davis, Malzer, Percich, and Simmons, Department of Horticultural Science, University of Minnesota, 1989.

cases may be tempered (shortened) by the desire to pack other crops before and/or after the sweet corn season. To make best use of plant and equipment and the nonseasonal component of the labor force, the packing season, and thus the acreage contracted, will vary only modestly (perhaps not more than 10%) from year to year. Budget development (planned acreage and forecast yield) will take into account: 1) the raw product tonnage that can be packed during a normal day in the packing season, 2) the long-term average yields early, midseason and late in the season, and 3) thus, on the total acres needed week by week to furnish a constant and uniform flow of raw product so as to: a) meet target output levels, and b) keep the labor force productively occupied. Contract price per ton of raw product will vary from year to year, depending on such factors as product inventory in stock, projected sweet corn sales potential, and on the current and projected price of competing commodities which farmers in the contracting area may grow as alternatives to sweet corn.

Before harvest, the optimum maturity of sweet corn for processing is determined in a number of ways. Subjective measures include:

1. Kernel color and its variability from butt to tip
2. Kernel fill and depth from butt to tip
3. Degree of seed set
4. Insect damage and other problems
5. Number of ears judged as ready for harvest
6. Kernel appearance from a cut sample composited across the ears

Objective measures are:

1. Kernel moisture from the cut composited sample
2. Probable factory recovery (degree of cut-corn yield from snapped, unhusked yield)

The samples from the various fields were compared with one another and also against a mental standard. The samples receiving greatest attention were from those fields which were nearest to optimum maturity. The differential appearance of each hybrid at maturity, and its characteristic pattern of change with time as it approached maturity had to be recognized and understood.

Percent kernel moisture was the most important single factor on which harvest decision was based during the last 10 days. The highest quality cut corn from most of the standard sweet corn hybrids would be obtained at a kernel moisture level of 72 to 73%. At 74 to 75% moisture, the flavor and taste were good but kernel size and uniformity, color, and cut-corn yield of the standard sweet hybrids might be below par. At 70 to 71%, a critical dividing point, yield was higher but the cut corn would appear to be older (large; darker yellow kernels) and might be tougher.

In addition to % cut-corn moisture, the visual judgment as to how many of the ears in each sample were ready for canning was a very important subjective decision which permitted the mental integration of other factors. A typical rule was that if more than 3 or 4 ears (from a sample of 15 ears) were judged as not ready, more time should pass or could be allowed to pass before the field was harvested. While the visual categorization of ears as ready or not ready would seem to the casual observer as a very imprecise evaluation, experience showed that it correlated very closely with % moisture and with postharvest grade evaluation.

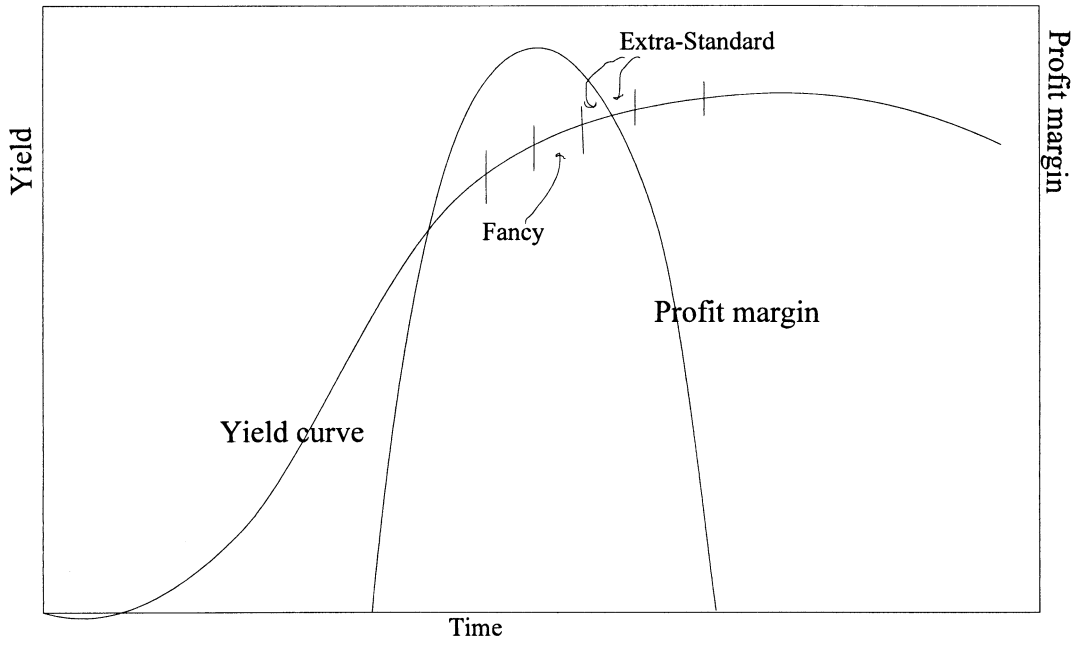


Exhibit 4. Graphical relationship between cut corn yield, quality grade, and probable profit margin for processed sweet corn.

In a generic sense, the relative value of the several quality grades and yield were interrelated (see Exhibit 4). Because quality grade primarily reflected degree of maturity, as the quality curve declined the yield curve increased, and, at the same time, the wholesale (and retail) per case value of the canned product declined. Thus, one must compromise between quality and cut-corn yield in setting the harvest date. The date set for a specific field might be influenced by several factors, such as: 1) the grade distribution plan for the company, and the actual distribution packed thus far in the season for the several grades, 2) the location of the field relative to the location of the harvest equipment (it may be practical to harvest a day early or a day late), 3) the degree of uniformity of the field (if nonuniform you might wait longer), and 4) whether canned corn was overly abundant or in short supply in the industry as a whole. Of course, many other uncontrollable factors, such as rain, anticipated rain, and equipment breakdown, also might influence the harvest decision.