This is Canadian agriculture today: a big business where efficiency counts most; a way of life almost unrecognizable to the farmer of 20 years ago; an industry beset with change, problems and paradoxes. For trained men with financial resources it is still the best of all lives. For others, their future in agriculture is a question mark.

VISIT TO A NEW COUNTRY

by Robert Collins

The southern Saskatchewan farmhouse where I grew up is now a sad and empty shell. I found it last summer, 20 years later, a derelict on a hill, its white clapboard walls weathered grey, its doors flapping raggedly in the wind, pigeons roosting on its kitchen cooker.

The truth that we coaxed to life in the drought years is choked with weeds. The barns and windmill have vanished. The 390 acres that we farmed with horses, in small subdivided fields, are tilled now in mile-long swaths by a mechanized farmer who cultivates hundreds of other acres in the district. Like many other Canadian farmers this is no longer a home but a place of business.

Five miles north, the town of Shannock, once the center of our universe, is withering away like many other towns. Once it had four trains a week; now it has two. Once all district farmers shopped there; now most drive over good gravel roads to bigger centers. The high school I attended may soon be closed. The main street has the shut-down, apprehensive look of a tv-western town just before the gunfighter rides in. In Shannock's little drama the gunfighter is change—and in this word, "change," lies the whole story of Canadian agriculture today.

My sentimental trip back home was only one small facet of a 10,000-mile journey into every province, meet-
ing farmers, farm educators, government administrators and farm journalists; trying to assess the state of our agriculture. It was a strange, pride-filled, upsetting journey—really, a visit to a new country.

Everywhere, rural life is totally unlike the life I knew 20 years ago. This change is not in itself necessarily bad and, anyway, was inevitable. What is disturbing is that no urban Canadians and few farmers have really faced up to it. Until they do acknowledge the revolution in our agriculture, and cope with it, Canada’s biggest business will be in trouble. It is deeply troubled now.

The first pertinent fact is that agriculture is a business. Once it was a simple easy-going way of life, almost self-sustaining, producing little capital and requiring little capital to operate. There are still such kinds of agriculture in Canada but they are doomed.

Today, agriculture is part of something called “agribusiness.” It involves not just tilling, sowing and reaping but chemistry, physics, genetics, economics, mathematics. It includes not only farmers but the makers and sellers of machinery, fertilizers, chemicals, oil and gasoline, government scientists and administrators, food processors, distributers and retailers, including the supermarket.

Viewed in this context it is, by far, the most important business in Canada. It accounts for 40 percent of Canadian consumer spending, one-fifth of our total exports and and employs 40 percent of our labor force (of which less than one-third are farmers and ranchers).

The farmer nevertheless is still the nucles of agriculture and he is not, as some of us still think, a bllithe and simple soul with strong arms and muddy boots. “Too many urban Canadians think farming is for the strong in back and the weak in mind,” says Dr. H. G. Dian, vice-principal of Macdonald College, McGill’s agricultural faculty. “Not so. It’s no job for misfits.”

Dian, a Ph.D. and D.Sc., vigorous and articulate like every other dean of agriculture I met, is a prime example of the new kind of agriculturalist. He could hold his own in the board room of any corporation. This is not to say that the average farmer is a Ph.D., although some day he might be. For now, he is sometimes efficient, sometimes a misfit and very often bewildered. Above all he is beset with problems and every Canadian who wants to continue eating has a stake in these problems.
"The profession of farming is being downgraded," says Blythe Eagles, Dion's counterpart at U.B.C. "Consumers have never in history had such a choice of good food at reasonable prices. So we've become apathetic toward food production. Unless people outside of agriculture take steps to improve the farmer's lot, we may someday find ourselves out of farmers at a time when the world increasingly needs food."

What, exactly, is the farmer's lot? Dion of Macdonald says, "A good average plumber or carpenter has a better life for his family than a farmer. Agriculture is a depressed industry."

At first glance it is hard to credit this statement. True, farm numbers are declining. There are now 481,000 occupied farms in Canada, a decrease of about 200,000 in 20 years. In the same period, capital investment in agriculture has soared from $4 billion to around $12 billion. In those 20 years the farm labor force has dropped from more than a million to about 650,000. Yet those fewer people have increased productivity by 54 percent. Twenty years ago one farmer fed himself and 10 others; now he produces enough food for 26 others. All of this is the result of an enormous technological revolution—mechanization, new science, more low-cost energy—that has, says Eagles of U.B.C., made agriculture "more efficient than any other part of the economy."

Moreover, the farmer is a big spender in the Canadian economy. Each year our farmers spend about $370 million on seed and feed, $85 million on fertilizers, $294 million on machinery and $21.5 million on electricity. They pay $162 million in property taxes, $54 million in rent and $58 million in interest on borrowed money. They buy 55 million gallons of diesel oil and one-sixth of the gasoline in Canada. Their total cash income in each of the last few years has been around $3 billion.

Surely, then, this is not a "depressed industry"? But it is. Our agriculture is total is as efficient as Dean Eagles says. But a minority of spectacularly efficient farmers beef up the production and income statistics. About 25 percent of farmers account for 75 percent of production.

Near Lacombe, Alta., I saw a modern version of the old-time cattle empire: a "feedlot" farm where hundreds of cattle in acres of corrals are fed in long shelters, from towering stacks of hay and silage. Two years ago a survey of such farmers in central Alberta showed that their net income averaged $15,000 a year. One man netted more than $20,000.

This kind of farmer is the exception. The average net income per farm across Canada is only $2,149. Of our 481,000 farms, nearly 133,000 are not even deemed "commercial": they sell less than $1,200 worth of produce a year. Another 9,900 sell less than $2,500 worth. Prof. Travis Manning, head of the department of agricultural economics, University of Alberta, says sales of less than $2,500—and perhaps even those below $5,000—probably mean the family has an inadequate income, since net income is probably no more than two-fifths of the gross. In that case, one-half to two-thirds of Canadian farm families are not earning a decent living.
"Farmers once considered themselves the kings of the land," Quebec's deputy minister of agriculture, Ernest Mercier, told me. "Now they are sometimes the kings of misery."

Yet why the misery? Consumers are buying more food than ever. Many food producers get subsidies. The farmer is his own boss, makes his own hours, raises his own food. If he's vulnerable and unsuccessful, surely it must be his own fault.

It's only partly his fault. Take your food bill, for example. Food costs have risen less in 10 years (19 percent) than ever (32 percent) or medical care (63 percent). And the farmer's share is shrinking. For each dollar you spend on beef, you get 57¢ on milk, 53¢ on bread, 115¢. The rest goes for transportation, packaging, processing, wholesaling and retailing. He needs all these services to market his product, of course, but the point is, he doesn't get all the money. And he doesn't raise all of his own food; the average farmer today may buy about $350 worth per year in town stores.

There are agricultural subsidies, true enough. But "protection" is not confined to agriculture (industry has its tariffs, its collective bargaining, its unemployment insurance). And agricultural protection may do more harm than good. R. C. Parent, superintendent of the Dominion experimental farm at Charloittown, says, "The only reason there's a surplus of dairy products today is that dairying is profitable, and it's profitable because of subsidies. The government has been too generous and that's a fact."

"Price supports are like painkillers," says Travis Manning of U. of A. "They alleviate the suffering but do not cure the disease and the side effects—such as overproduction—may turn out to be worse than the original pain."

This is not the only cause of overproduction, of course. Another is the uncertainty of weather and biological factors, over which the farmer has only limited control. The new technology has increased production, too, and—because it has made his fixed costs much higher—the farmer uses it to increase his output even more, thereby reducing his per-unit operating expenses but adding to surpluses.

"Of course we have rarely only two surpluses," says Dion of Macdonald College. "Wheat, because of our better techniques of production and because some of our traditional European customers are producing more of their own, and butter, because we continue to buy milk and cream on a butterfat basis instead of emphasizing the more valuable protein and non-fat solids in the milk. Even so, the butter surplus represents less than three months' Canadian consumption."

However, high production contributes to a farmer's "misery." Where and how can he sell his products? There has never been a really satisfactory answer to that problem but agriculture keeps seeking one. Ontario, for example, has about 18 marketing plans covering 31 crops—more than all other provinces combined. Broadly speaking, they break down into two methods: group bargaining, which can be effective if wisely used, and the market-

agency, under which complete control of the product is transferred to a sales agency. Some farmers dislike the latter because it restricts their individual freedom.

Which is yet another cause of the farm's misery. He fears for his autonomy or, worse yet, for his very job—and with reason. The hard fact is that small inefficient farmers are being squeezed off the land, not by any person but by circumstances.

One major reason for this is lack of money. Once a man could get by on work and ambition. Now he can't. The capital investment required to farm even an average and as high as $150,000—is beyond the reach of the average man. "We're machinery-poor," said one of my ex-schoolmates, Ken Hagstrom, from his field in southern Saskatchewan one day last spring. "Twelve thousand dollars for a self-propelled combine... $7,000 for a new tractor... And land! It's selling for twice what it used to."

Year-to-year operating expenses are equally high. On a typical commercial livestock farm in Ontario, cash operating expenses amount to 70 to 80 percent of cash receipts. A University of Manitoba four-year study of 80 farms around Carman produced these average annual figures: capital invested-$65,000, deprec-$11,000, cash receipts-$19,000, cash farm expenses-$16,000.

It's obvious if a man is going to stay farming or stay in farming these days, he needs credit. For too many years, says Dion of Macdonald College, there was no satisfactory farm credit system in Canada and "we delayed Canadian agriculture by a generation through this financial policy."

The situation is better now. Through the Farm Credit Corporation, farmers can get long-term loans for purchasing land or paying off land-secured debt. Through the chartered banks they can get farm improvement loans, guaranteed by the federal government, for modern machinery and buildings. In addition, several provinces have their own credit plans for farmers.

But, says S. H. Lane, professor and head of the department of agricultural economics at O.A.C., it is doubtful if there is yet enough credit. We'll probably see pressure on farm supply businesses to finance farm operations through offering short-term credit.

No matter how much credit becomes available, it is useless without knowledge. Too many farmers don't have enough technical knowledge for today. Too many are poor businessmen. The really successful farmer has to know bookkeeping, feed additives, fertilizers, crop planning, income tax, marketing, credit policies and crop insurance, to name a few. In short he has to be an educated businessman and technologist, and he must stay that way.

"It is quite possible for techniques to be outdated in five years," says Dr. J. R. Weir, dean of agriculture, University of Manitoba. "That means that in a working lifetime a farmer could be outdated seven times. Agriculture is no place for a man with a Grade 10 education and no place for a man who is trying to learn agriculture by apprenticeship."
A GALLERY OF AGRICULTURE

by Robert Collins

What is Canadian Agriculture? Mostly Saskatchewan wheat, Alberta beef or Prince Edward Island potatoes? It's these things and many more.

British Columbia

Newfoundland

Saskatchewan

Ontario

Imperial Oil Review, October 1963
A neatly-painted house in P.E.I., a bottle of vegetable oil in Manitoba, a waterlogged Russian thistle in Saskatchewan—how do these fit into the story of Canadian agriculture? Read on.

The Dream of Water

The South Saskatchewan dam brings hope

The rest of Canada has always known it as the “dried-out” province, and with reason. More than 100 years ago John Palliser, surveyor for the British government, sketched out a triangle on his map of what are now the southern prairies and said this parched land would never be fit for agriculture.

The settlers farmed it anyway. But in the 1930s those of us who lived in Saskatchewan watched the wind lift clouds of topsoil that blasted out the sun. Sand dunes piled up along the fence-rows. Tumbling Russian thistles swept across the fields like conquering armies. “If only there were enough water...” people said.

Which is why, of the $80,000,000...

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When it’s Roundup Time in Holyrood and the Bloom is on the Bog

A first, looking down from the air on the wrinkled face of Newfoundland, I wondered, “How do you till this land? We have to work too hard here!” its rocky hills are raw and new, scratched out by the glaciers a mere 7,000 years ago. Its slopes are thickly cloaked in evergreens. Its valleys run blue with rivers and lakes. How do you farm such a province? Yet Newfoundland has 1,200 farms, tilled in deep pockets of fertile soil around St. John’s and strung out neat green-checkered boarders along the Gros Morne southern of Corner Brook and the indomitable Newfoundlanders, who are used to rehashing nature to its own specific, are actually making raw—land—from bog.

Newfoundland has about six million acres of bog: soggy tracts of seven percent soil and 93 percent water, sometimes covered with lichen, moss or scrub timber. A man or a cow can slosh to the belly in them. In their natural state they are worthless. When drained, they provide pest fuel, peat moss for gardens or acid in Newfoundland, arable land. In 1955, a Newfoundland royal commission advised reclamining the bogs. Deputy minister of agriculture Pattram called in an Irish expert, Vincent Healy. Healy, a small smart man with a ginger-colored moustache, landed at Gander airport on St. Patrick’s day, March 17, 1956. Bogs haven’t been the same since.

So, far the provincial and federal governments together have reclaimed 900 acres. Most of this is in grass, some in cultivation and carrots. If this seems a modest beginning, remember that reclamating, by any standard, is difficult. It needs a proper dose of time to counteract acidity. It needs fertilizer; the experts are still experimenting with proportions. Probably it needs oil elements found only in mineral acids, says Healy, because cartilage feed on bog grass still have a taste of grass they grow on other soils. It will be several years before the combined research produces all the answers. But there have been accomplishments. Vinny Vassallo, Newfoundland’s head quartermaster in Holyrood, has devised a special track to implement the work and even a fruit broken. Its chips are more familiar to us, are in Holyrood’s valleymouth to dig ditches (it scatters the residue evenly over the land instead of leaving a big untractable furrow). Cattle, now grazing on what was once a spongy meadow, have recorded weight gains of two pounds per day.

One of the major potential crops in Canada but none but more earnestly pursued or as important to its area as this one. Newfoundland needs much more—home-grown food. It exports blueberries, it nearly in itself the eggs but exports must other foodstuffs, including 95% of our frozen meat, its meat. Many optimists think that if enough land is reclaimed and if large herds can winter out here, the province could be self-sufficient in beef and Newfoundlanders will be able to feed the big bog.

“It’s wonderful for grass, this bog land,” said St. John’s man told me, with that 60-watt-to-the-minute enthusiasm that Newfoundlanders have. “With the laydown on and all the soil—ah, you can almost see the grass row!”

To Market, to Market

All the bounty of Ontario is here.

A 5:45 am each summer working day the lights blink on over the truck-loading docks at the Ontario Food Terminal in Toronto’s western suburbs. Instantly—as though everyone and everything on this 50-acre site were hooked to the same switch—a wholesale market, unique in North America, springs to life.

Scores of hundreds, thousands of tons of meat and vegetables begin to move. In the open-air farmers’ market at one end of the tarnish, as many as 500 country stores, most of whom rose before dawn to drive here, haggle happily with buyers from the big and little grocery stores all over Ontario. Nearby on either side are two produce buildings, which make up the wholesale-market proper, commission agents for other growers sell from 40 warehouse-stores.

The air is full of shouts, reviving noises, chattering cots and the clean, unmistakable country-kitchen smell of fruit and vegetables fresh from the garden and orchard. All the bounty of Ontario is here, and some from Sault, too. Maybe pears from Argentina, apples from New Zealand or potatoes from the Maritimes, all unloaded from the 200-car railway yard that borders the south side of the marketplace.

By mid-morning the chaos settles down to a hum; by two p.m., the official class of buying and selling, it is quiet. By then some of the food is already moving through retail stores to Toronto dinner tables. More is coming in from the farms. Winter and summer, the daily cycle goes on.

Which is why Robinson, now 75, never tires of looking down from his office window at the hubub in the marketplace. “A market should be crowded; it’s psychologically good for business” and likes to remember the day Thomas Kennedy came back to see the place, shortly before he died.

“You know, Bobby,” Kennedy said as he looked around that day, “we built it better than we knew.”

The Secret Life of the Potato

From a half-million tons, six new varieties

There were, I discovered in Fredonia one day last summer, a couple of dozen things I didn’t know about potatoes. Do you think, as I did, that potatoes only come in a bag or as frozen French fries or as “chips” or as chips? And that it’s no problem growing potatoes? That most of them grow in Prince Edward Island? Come take a look into the secret world of the potato.

To begin with, there are about 20 different types and styles of dried potatoes, 30 different types of the frozen product and a few other categories. There are dehydrated potato flakes, granules and dice. There are frozen potato pancakes, pearls and colors. You can get the frozen product diced, shredded, mashed, hash brown, as grates or riceable. There are potato crackers, pancakes, soup, chip bars...
and potato "mats." There are canned French fries and potato salad. There is a dried potato pulp, or pomace, which makes cheap, efficient feed for livestock.

For all its versatility, the potato is a prana-divine task, the root of a dozen or more diseases and pests, including bacterial ringrot, verticillium wilt, blight, wire worms, blackleg, aphids, leaf beetles, potato scab, mosaic, club, mosaic, spindle tuber, leaf roll, potato beetles, wart—all, you get the idea.

Perhaps the most surprising fact, to most Canadians, is that New Brunswick grows more potatoes than any other province. Potatoes aren't its biggest farm crops (cattle and dairy products are). Nor does it produce all the aforementioned potato products. But last year New Brunswick produced 103.0 million hundredweight and had the highest average yield per acre: 20,000 pounds. (The runner-up, incidentally, were Ontario, Quebec and P.E.I. in that order.)

New Brunswick's three potato starch factories are the biggest in Canada (their product goes mainly to the paper industry; potato starch makes better bond paper than cornstarch). And nearly all Canadian potato breeding is concentrated at the Fredericton federal government research station. There, scientists are constantly seeking out varieties of potatoes, a slow painstaking job. From perhaps a half-million seedlings grown since 1930, 13 new varieties have developed. To complicate the job, the scientists must take into account the specialized requirements of each region: a resistant potato for one province, an early tuber with some blight resistance for another, a mid-season blight and/or virus resistant variety for one area, a virus-resistant variety for another cause the not-so-lovely "spud" is so versatile and basic to our diets, the search for the right variety sometimes transgresses all other things. Once a Newfoundlander told me a research station officer, "If you can give us a potato, a yellow- or black-skinned potato fried free of warts, it's worth the price of Confederation."

**The Oil (Seed) Boom**

From the Maritimes sunflower, an edible oil

E ven on that table-flat land south of Winnipeg the town of Altona, population 2,146, is little more than a blip on the horizon. Just another prairie town, it seems at first. But two things make it different. In summer, the surrounding fields are gold, yellowed with sunflowers. And Altona’s biggest building is not a grain elevator but a vegetable oil plant, the latest of a chain which, in North America, includes sunflower seed, and a symbol of how one prairie town changed with the times.

In the 1930s this part of the west, like most others, was hit by drought and depression. Some districts never recovered from those days; Altona turned them to advantage. Its farmers realized that dependence on cereal crops alone was too risky. Many of them came from the Ukraine; they knew about oil seed growing and processing from back home.

So Altona went into sunflower seeds (and, to some extent, corn, sugar beets and other diversified crops). When the Canadian government urged large-scale production of oil crops in World War II, Altona was ready. By war’s end, business was so good the community built a factory, with an investment of $160,000. Today assets exceed a million dollars.

Neighborhood farmers now raise about 30,000 acres of sunflowers. They also process soy beans (imported and rapped up, to keep the plant running year around. There are, Altona discovered, all sorts of things you can do with sunflower seed and oil. A new plant crushes the processing crushes the hulks, processes the resulting high-protein livestock feed. Seed husks are pressed into firewood logs. Some of the seeds are roasted or sold as sunflower seeds in bulk, and sold in packages; people eat them like salted peanuts.

The plant employs about 35 people, all from the district and mostly farm-raised. "We did it all ourselves," says John Enns, the plant manager, "and we all raised the job. I even helped dig the first foundation. We're very proud of it." Which they should be—for in these days of the dying rural town, Altona and its population are very much alive.□

**The Annapolis Apple "Factory"**

Charlie Fosti has "worked apples" 18 years

C harlie Footy of Cambridge Sta
tion, N.S., was guiding a tractor and mower among his apple trees when we found him one afternoon last June.

"He cut his grass early," said my companion, a man who knows all the growers in that part of the Annapolis Valley. "If he doesn't get 'em in very early, he can get in very late. Charlie knows that. He's a good grower. If there's work to be done in the orchards, he does it."

It soon became clear that Footy, a shy 49-year-old man in overalls, is a good grower. He's been "working apples" in the Annapolis Valley since 1940. His orchard was 4 1/12 acres in the present 40-acre orchard in 1946, has 2,300-2,400 trees, raises about 20,000 bushels a year, has netted a few dollars a year and so far has sold two of his four daughters to college.

Like most other good growers he no longer raises many annoyances. Parts of his orchard produce valuable varieties for processing; this is the trend all through Varnum County.

Dairy products, cattle, eggs and poultry are the province's main agricultural products but the apple industry is still important—and it's in the midst of a great upheaval. Nova Scotia apple growers today have always faced stiff competition from B.C. and Ontario but the rest of the "green skin" variety were shipped abroad where they were popular, particularly through the rise of supermarkets and the emphasis on trimming appearance at a selling point, the red apple smile. As the market for red apples in the fall, Scotia converted many of its orchards to red apples.

The packing industry also took a new twist in 1970: 60 percent of the crop is now processed. The Annapolis Valley is booming one great apple factory, growers and processors, working in concert, converted about 1.3 million bushels a year into 15 different products.

"There are canned apple nectar, apple cider, apple vinegar, apple juice, apple wine, apple pie filling, jelly, apple sauce. (The last in an attempt to convert raw material in the manufacture of apple jelly, apple wine, microscope, vinegar and soft drinks, including five popular carbonated beverages in Mexico and Guatemala.) There are frozen apple slices, dehydrated apples and evaporated apple juice. Every skin and core is turned into dried apple pomace, for livestock feed and for petin a basic ingredient of jelly.

There is still a modest market for fresh fruit, helped nowadays by "controlled atmosphere storage," a technique whereby apples can be stored several months without deterioration. But, says N.S. minister of agriculture, E. D. Halliburton, "The hope of our apple industry is in processing."□

**Sheepman at Home on the Range**

The "new country" cattle, O'Neil sheep

A s a. u. ordered-off farmer I have a "pet" sheep. I know now, cattlemen cannot raise sheep without their deep sheepdog, and they cannot raise sheep. "Get off't much property sheepman. They ain't even enough in this country for you and me ... You wouldn't know by looking at me."

I was harvesting oats one day when I noticed that in Alberta, ranchers and sheep raisers live in perfect harmony. Alberta is still ranch country. Cattle are the major "cash crop." South of Calgary the land is spangled with blind-eyed Herefords. Real cowboys still ride into town (you can tell them from the bankers and used-car dealers; the working cowboy wears a dirty white hat). But last year Alberta raised 300,000 sheep, one-third of the Canadian total and more than the provinces combined. Sheep husbandry hope Canada will raise much more. Presently, we can eat only 3.8 pounds of lamb per capita per year compared to 70 pounds of beef and 70 pounds of pork. The business has been troubled by low prices and wool prices; e. g. sheep have declined. The hope for the sheep industry now is in the increasing numbers of farmers who keep small flocks, coupled with other livestock. When I visited 46 sheep farms in New Zealand a barred-flecked man who shears 140 Suffolk sheep on 24 acres beside the Canterbury Expressway in the Scenic Mountain area near Invercargill. Monroe is a happy sheepman. More than that, he is a born farmer. He was a machinist and welder during most of his life but always wanted to farm. Four years ago he invested his savings in land and has never regretted it. Besides sheep he keeps pigs, chickens, pigeons and seven dogs (including three gourmands and a Boerboel Collie named Angus). He has also built his house, which looks as though it came straight out of a barnyard-and-gardens magazine.

Monroe is tired with curiosity and ingenuity. He has devised such gadgets as: A swinging tooth-pen for dogs, so they can comfortably run, roll, and enjoy themselves on a leash. A fork for the gourmands’ pens, which humans can open at a touch and give its forked leg for pig pens, which also doubles as a barrier to keep them out of their feeding troughs when he’s filling them. An hour water bowl for pigs, so they won’t drink the water, and raised sleeping platforms so they won’t dirt themselves. Water by hydrant for sheep. A special sheep sewage system in the barns, whereby manure is flushed out and converted into liquid fertilizers in an underground tank. Each day is a delight, with new problems to be tackled and solved. "I wouldn’t trade this place for anything else. I’d be perfectly happy to have the sheep used to say: 'When you get all fixed up I suppose you’ll sell it.' Now why should I sell it? When I sold it I soft it! I fix it up myself!"

"We’re always busy and that takes a lot of getting used to," his wife.PROSA said, over a cup of coffee. "But we can stop file this whenever we like, and that’s one of the joys of farming."

That’s it," Monroe agreed, and then he spoke for every happy farmer who ever lived. "Nobody bugs me. I do what I please, when I please, and that’s that."
They have a full-fledged workshop, a cavernous cold-storage shed (reduant with fresh potatoes), more than 500 hired laborers in peak seasons, and $100,000 worth of machinery, including 10 tractors and a couple of self-operating but effective machines to cultivate, weed, fertilize and harvest. The last two were invented by son Maurice, a self-taught mechanical wizard. The Guinonic make money and have fun.

When I visited Pierre Guinonic last summer he was contentedly rocking in the farm kitchen of one of his sons. Guinonic, all around, were the Guinonic acres. Behind him on the wall hung a plaque noting that Pierre had been acclaimed Quebec’s “Farmer of the Year” for 1963. On his knee a small great-grandson dozed. How many grandchildren and great-grandchildren did he have? “I’m not sure,” he said. “Maybe 45, 46. Every month or so a new one comes along.” One thing is sure: there will always be a Guinonic family farm in Quebec.

BEAUTY BY THE ACRE

Contrary to whatever else you have read, Prince Edward Island’s main agricultural crop is beauty. True, the rich red clay produces 6.4 million hundredweight of the finest potatoes in Canada and last year the green fields yielded $11 million worth of cattle and dairy products. But as any Islander could tell you, God really put the rust-colored mud and the emerald grass on P.E.I. to complement the sky-blue streams and to please photographers, poets and Sunday painters. P.E.I. is the only province in Canada that looks better in reality than in its tourist brochures.

This is not entirely an accident. The Islanders believe in giving Providence a nudge. Which is why P.E.I. has the only province-wide rural beautification society. The P.E.I. R.B.S. is, quite unabashedly, dedicated to making the Island prettier. It began 17 years ago. This year about 180 rural people vied for prize money and silverware in several categories of competition. The original class, and still the sentimental favorite, is farm home improvement. For a $2 entry fee any bona fide farmer can compete for 500 points, awarded for such things as planting trees, hedges and shrubs; fixing and painting fences (they even paint the barbed wire in P.E.I.); putting names on mail boxes and getting rid of rubbish. But there are other categories: for beautifying flower beds, cemeteries, dairy barns, clergyman’s residences, schoolyards, roadsides and tourist courts. Since the P.E.I. R.B.S. was founded, vendors of paint and color film have never had it so good.

The Islanders are by no means content. This year they were doggedly attacking long grass and other eye-sores along main highways. Last summer I attended an earnest discussion between an official of the P.E.I. R.B.S. and another Islander. It seemed that—all, the shame of it!—in a certain county abandoned cars were being left to rust in full view at the side of the road.

“There’s talk of the government dragging them away and crushing them up in a big, mean press,” said one of my companions.

“That’ll have to do something,” said the other soberly. “A thing like that spoils the whole look of the countryside.”

Which, in countryside as purely perfect as P.E.I., is a mortal sin.

HOW 4-H HELPS THE STOWS

When an industrious farm family applies the high-minded principles of the 35-year-old 4-H clubs, farming becomes “a joy of life and a work of love.”

by Marjorie Earl

The Stow family of Gravenville, Man., belong in an advertising folder designed by a master publicist to promote the farming industry and the 4-H movement. There are 14 of them, eight adults and six children and to them farming is a business, a pleasure, a way of life and a work of love with most modern conveniences. Some of their activities are the ordinary activities of farming made extraordinary by hard work. Others are extraordinary to begin with and still others seem to be an outrageous addition to the pressures of life on the land.

4-H clubs (the ‘H stands for head, heart, hands and health) belong in the extraordinary category and their motto, “learn to do by doing,” might have been composed for the Stows instead of for an organization with 70,000 members in Canada and two million in the United States.

4-H clubs are like wildflowers; they blossomed all over the landscape between 1900 and 1915. The idea was a rasion all through a family, too. Officially, membership age in most clubs is 12 to 20, but 4-H inevitably influences everyone in the household. The first official mention of farm clubs in Canada is in a report of the Manitoba department of agriculture for 1913. It records that a public-spirited agricultural technician named E. Ward Jones, in co-operation with the Manitoba College of Agriculture, that year organized eight clubs with 40 branches and 472 members. To those who wished to “learn to do by doing,” he gave “one dozen eggs from the best laying strains in the west,” 500 grains of three varieties of the best fodder corn” and a “sample of pure-bred potatoes” and at the end of the season awarded prizes to the best of the 128 entries of potatoes, 100 cups of chicken and 75 exhibits of corn. Last May 12 a cabin commemorating this event was unveiled in Roland, Man., designating it as the authentic birthplace of 4-H clubs in Canada, just 50 years ago.

By happy coincidence—or maybe fate intended the Stows and 4-H to be together—James Stow Sr. left England in 1919, and went to Gravenville just 15 miles from the place of 4-H (he was a city boy who wanted to farm—and he did). When the first 4-H calf-raising club was founded there in 1939, the eldest son Alex, then 11, won first prize for his calf. From then on the words “Stow” and “4-H” were synonymous.

James Sr. shared the leadership of the club for six years. In 1947 Alex won a judging competition and was sent to Toronto to compete at the Royal Winter Fair. In 1953 Doug, then 20, won the same competition and went to the Royal Winter Fair. In 1953 Reg, then 18, won and went to the Royal Winter Fair, where his club calf was reserve grand champion market steer. In 1958 Jim Jr. then 17, won and went to the Royal Winter Fair. Doug, who used to be leader of the sheep club, is now leader of the calf club and president of the local 4-H leaders’ association. Reg has been leader of the tractor club. Alex, who chauffeured a 4-H delegation to Iowa in 1958 and whose wife, Pam, was also a calf club member, used to be calf club leader but he is now re-
tired from 4-H at least for the time being.

"There’s been only one year since 1939 when there hasn’t been a Stow in the cattle club," he says. "That was last year when Jim was in university and my daughter, Christine, was too young to join. She’s the youngest member now, not quite 10, and getting a calf ready for exhibition in the fall. She’s just survived her first 4-H public speaking competition."

Alex feels that their parents made them 4-H enthusiasts but he adds, "I can’t remember being inspired by any great philosophy. Perhaps the most decisive influences are those that work unseen, for the philosophy of the 4-H movement is the philosophy the Stows live by. For example, one of the aims of 4-H is to help ‘rural boys and girls develop desirable standards of farming and home making.’ Another is to train them in co-operative action for solving rural problems."

The Stows’ standards of farming and home making could hardly be more desirable or more co-operative. There are three families of them: James Stow Sr., his wife and sons Reg and Jim; Alex, his wife and four daughters, and Doug and his wife Kay and their son and daughter. They live within two miles of each other and between them they cultivate 1,300 acres, market 350 hogs, 200 cattle and 350 swine a year and have 4,500 hens laying 12 months a year. Their land is owned by a holding company and they are the owners of the company. Their business is owned and operated by five partners and they are the partners. Alex is in charge of the swine, Doug of the poultry, Jim of the cattle, Reg of the machinery and crops.

"In the beginning," says Doug, "we were almost too co-operative. We found we were tied up in too much talking." When Doug completed university he assigned himself to the family poultry flock. "I enjoyed it but I thought our flock wasn’t large enough," he says. "We received enterprise prizes twice; then we started our present operation." As might be expected it was a completely co-operative operation. The boys bought and received assistance from the feed company, the hatchery, from poultry experts in the provincial and federal departments of agriculture and from agricultural engineers at the University of Manitoba in order to make theirs an efficient, well-managed operation.

The women of the family elevate the standards of homemaking in their own co-operative. In the elder Mrs. Stow’s kitchen they can freeze all the vegetables and fruit needed for the winter. They prepare and grade the eggs for shipment. Mrs. Stow also belonged to a food club, and decorates wedding cakes as a hobby. A major 4-H objective today is the development of character and citizenship. Another is "to help rural boys and girls develop desirable standards of community life" and another is "to teach the wise use of leisure." Not one of the Stows has neglected good citizenship or the community but as far as leisure is concerned their responsibilities have left them alone, at least not leisure as the city demands it. Their joy and relaxation comes in a multitude of other ways; a birthday supper between the chores, a game with the children, a compassionate extra five minutes over a cup of coffee.

Mrs. Stow was for several years a member of the local agricultural council, a link between the government extension department and the community. Alex has now taken her place. In addition to their 4-H work all four brothers are active in a local agricultural society (Alex is on the senior board of directors, his brothers on the junior board). Mrs. Stow is an officer in the ladies’ section. The family partnership is a member of the Carman District Farmers’ Business Association — Doug is vice-president and Alex a director. This is a research project sponsored by the University of Manitoba to train farmers in business.

Reg is secretary of the local Manitoba Pool Elevators’ Association. Alex is on the rural school board. The whole family belongs to the United Church of Grayville: James Sr. is an elder; Alex is a steward; Doug was superintendent of Sunday school and now leads a group of junior boys; Alex and Pat lead senior young people’s groups; Doug’s wife, Kay, helps teach Explorers.

"It’s something you really have to watch," says Alex, with an understatement that is typically Stowian. "It’s easy to become over-involved."

Still another 4-H objective is "to instill in young minds an appreciation of the rural environment." The Stows find much to appreciate. "We like our work for the same reason any man likes his work," says Jim. "A decent income and a satisfying job." "Opportunity too," says Reg, "and Dad gave us the opportunity." "I’ve always wanted to stay on the farm," says Alex, "but I guess it wouldn’t suit everyone." Anything about it that doesn’t suit the Stows they change, including the typography. They are now engaged in a farmland landscaping and improvement program sponsored by the Manitoba Pool Elevators. Last year the elder Stows won first prize for the farm showing the most improvement. "We used to have 300 sheep," says Doug. "But sheep and landscaping don’t go together so the sheep had to go."

Alex, who recently planted an avenue of elms, an evergreen grove, an orchard, a perennial border, a huge lawn dotted with ornamental trees and flowering shrubs and built a playground for his children, sees his work with the contented eye of a man who looks forward to the future — and with the appetite for doing — that has made 4-H families the strength of this country’s agriculture.

"In 10 years there’ll really be an improvement around here," he says.
THE OLYMPICS OF PLOWING

IT IS FIVE MINUTES TO NINE on the morning of October 10. A green flare arches over the fields of a farm near Caledon, Ont. Thirty-three champion plowmen from 18 countries start their tractor engines, wipe their palms nervously, run a critical eye over the field for the thousandth time, wait for the go-ahead signal, wipe their hands again.

On the nose of nine the starter's gun kicks a red flare into the sky. The tractors rev up; the men ease them into gear; machines and plows lumber out onto carefully-staked plots of land. The 11th World Plowing Contest is under way.

This day and the next, each man—a champion or runner-up in his own country—will test his skill against the best plowmen in the world. At the end of the furrows, for one of them, waits the Esso Golden Plough, emblematic of the world championship. With it go interviews, photographs, banquets, the adulation of other farmers—and all of this for simply plowing a perfect furrow.

Simple? There is nothing simple about a plowing match. Just look behind the scenes at the well-oiled machinery of the Olympics of farming.

For the spectators, a world plowing match lasts two days. For the planners it runs months, even years. This one began with an idea in 1953: why not have the 1963 match in Canada? It would be an anniversary; the first world match was here in 1953.

One of the prime movers was Alex McKinney, a Brampton, Ont., farmer, president of the Canadian Plowing Council and vice-chairman of the World Plowing Organization. Before broaching the idea overseas, McKinney had two tasks. He had to confirm that Imperial Oil would look after the living expenses and post-match tour for contestants and managers while they were in Canada.

(The Esso affiliate in each country has always borne these expenses.) He also needed support from the Ontario Plowmen’s Association; it made sense to run the world contest on the same site and in the same week as the annual Ontario match. The Ontarians were already settling on Peel county as their 1963 site. They now quietly looked for a site that would also accommodate a world match (if it came to Canada).

Just any land wouldn’t do. It had to be accessible to population centres and transportation facilities; had to offer similar plowing conditions for all contestants; had to provide two plots (about 21 by 108 yards each) for each contestant, space for a marshaling yard and room for the WPO headquarters building.

The ideal spot seemed to be 1,600 acres near Caledon, owned by Coon Smythe, founder of Toronto’s champion hockey Maple Leafs. Smythe agreed. (For him this meant some careful crop rotation so that in 1963 each contestant would have one plot of stubble and one of sod.)

With these guarantees and tentative plans, McKinney took his proposal to the WPO directors’ meeting in France in 1961. They liked the idea and—when McKinney and Ray Frey, Imperial’s agricultural advisor, then drew up a detailed plan—solidly confirmed Canada as the 1963 host country.

Now the planning began in earnest. Frey became full-time co-ordinator for all Canadian arrangements. It meant traveling, attending meetings, drawing up 11 committees and...
serving as ex-officio member of each, lining up scores of other workers, literally "living" plowing for nearly two years.

Soon the plows numbered in the hundreds. Place yourself in their shoes. You must piece together a jig-saw puzzle of detail. The contestants’ plots must be chosen, surveyed and marked.

You also check on electricity, on air hoses and an adequate water supply for the marshaling yard (the tractors use water and air in their rear tires for better traction). You see that the machinery company mechanics will be on hand to service tractors and plows. You get an eight-inch cut stone from each participant country, clear it through customs, store it, finally have them all built into the Cairn of Peace, a monument traditionally left at the site of each match. You get two flags from each of the 18 participating countries, and raise 36 flagpoles.

You take over all 47 rooms of the Royal Hotel in Guelph and arrange to have the plowmen trundled from there to Caledon, a half-hour’s drive, in chartered buses each day. Each contestant must arrange shipment of the tractor and plow he will use but you look after customs clearances.

Erection of headquarters building, organization of daily schedules, presentation ceremonies at the plowmen’s banquet, publishing of the 160-page official handbook, the Imperial Oil post-match tour (of Niagara Falls, Erin fall fair, NHL hockey game, a visit to the Ontario Agricultural Col-

lege and Thanksgiving Day on Canadian farms)—all of these must be attended to.

The match begins. Plowshares bite into sod and you have a long sigh of relief. For you this is nearly the end and somehow, incredibly, everything worked out right.

To outsiders this is just the beginning of the world match which, this year, is really two events. On the one hand it is "tent city"—a gay, noisy outdoor carnival. It swells with happy thousands (some of whom never bother to see the plowing match), gleans with the fresh-paint shine of farm machinery exhibits, tickles the nostrils with the aroma of hot dogs and French fries and roast beef dinners cooked by Women’s Auxiliaries.

Within sight and sound of this place is the match. There it is all earth and sky, the good familiar smell of dust-and-gasoline, the grumble of motors, the soft tearing of sod and stubble.

If you are a contestant this is your world for two days. You are a pro. You have handled plows and tractors all your working life. This year you are one of the two best plowmen in your country. But there are 32 other good men here today.

You must work to a long list of rules but basically they amount to this: you must plow straight, neat, narrow, shallow furrows and build a perfect crown; must set up a uniform, well-packed seed bed; must bury all vegetation completely so it will not quickly to provide organic fertilizer and leave drainage channels under the furrow. And you must have a neat "finish." Do all this perfectly and you win 200 points.

Around you, somewhere, are judges, plot stewards, your family or friends perhaps, other contestants working other plots. You don’t see them. Even the thought of the championship and its honors fades into the background. You are doing now the only important thing, the familiar thing, the thing you always do: plowing the best possible furrow so that it will grow the best possible crop, October 10. The contest is on—between you and the land.

Tractors, tractors, everywhere—and a small girl makes an unofficial judgment.
A billion years ago, give or take an age—a drop of water worked its way into a minute crack in the dark rock which covered most of the land surface of the young planet Earth. The next time the weather grew colder the water froze, expanded, and, expanding, pushed against the sides of the crack. In time the rock yielded. A small piece broke free and tumbled down the slope. Repeated an almost infinite number of times, into countless places over the unbelievable long ages of geological time, this weathering action—the push of water expanding ice ten feet, the ability of water to dislodge certain materials; heat; cold; the wearing action of the wind; the grinding of the restless mountains of moving ice—called glaciers—broke large amounts of the rock into weathered sizes. In some cases the particles were less than two microns in size or so small that at least 48,000 of them, end to end, would fit along a one-inch line.

Dropped into ancient seas, carried by forgotten rivers, hurled about by the wind, bathe by those ancient seas, the broken rock was eventually deposited over certain areas of this planet, usually divided according to size into layers or "fissures"—the upper horizon made up of the smaller particles. In the upper horizon were sands, silts—composed of particles smaller than sand—and finally the material made up of the 48,000-to-the-inch particles, technically called clays. These, although subdivided into many different types, are commonly lumped under the titles "earth," "clay," "silt," "top dirt." Few of the things which man found waiting for him are more involved with him than this material. From it must come all life—not just in the sense that it provides a medium in which plants grow, but also in the sense that it, and only it, is the source of certain basic elements which are the well springs of life. Taken into the plant these elements are converted into the carbohydrates and the highly complex protein molecules which are at the root of the organism called "life" and the attendant forces such as growth, reproduction and heredity.

And almost from the beginning, man, perhaps first sensing this, if not suspecting or knowing, has tilled it, scoured with it, cursed it, mistreated it and watched it blow or wash away. But also he has loved it, formed a bond of understanding with it and sometimes in the process come to ascribe to it an ability to give, take away, be perverse, and finally believed or reasoned that it could not only support life but in itself alive. Which in a very real sense it is.

For if this thin layer of material was simply an inanimate aggregate of pulverized rock there could be no life on land. Within exists a dynamic, complex, highly interrelated world of visible and invisible motion and life almost all of which exists to feed—directly or indirectly—the life giving elements into the plants and ultimately—sometimes through animals—to humans.

How does soil live? What is it?

The life or activity within soil ("dirty" and "earthly") are swearwords to the soils specialist) takes two main forms. First, the micron-size (48,000-to-the-inch) particles and the roots of growing plants, operate between them a barrier system on the active trading of lost—atoms bearing an electric charge.

Second, living among the particles is an involved, multi-layer society, most of whose members directly or indirectly feed the plant; some of whom feed off it thus destroying it; many of whom wage a constant competition for food and turn the living earth into a battle ground. While it is impractical to list them all, this, generally, is the world of micro-organisms—bacteria and viruses so small that millions live in a pound of soil. They are followed up the scale of size by fungi, then wiggly ellipsoid shapes called nematodes, insects, earthworms and animals such as gophers, mice and rabbits. The micro-organisms are vital to the soil. Some of the nematodes attack plant roots. Most of the other creatures alter in some way the soil's structure and character.

Because the barrier activity and the biological life are so closely inter-related, it is almost impossible to talk about one without involving the other. Further, the many different types of soil have varying characteristics and compositions. But, considering the barrier system alone, soil is composed of several different elements some of the main ones being aluminum, silicon, potassium, calcium, phosphorus, magnesium, sodium, nitrogen, iron.

FOR THE PARTICLES, A BARTER ECONOMY

The micron-sized particles which are the building blocks of soil are mostly composed basically of aluminum and silicon in complex combinations and in varying proportions according to the type of soil. The remaining elements—which are plant nutrients and the basic building blocks of the "life" medium—are in the form of ions which cluster around the particle in much the same way as from filings cling to a magnet. Meanwhile, clustered on the plant root are ions of hydrogen, or of hydrogen and oxygen, taken from the atmosphere.
NEMATODES: A BILLION TO THE ACRE

On up the scale from the micro-organisms are the eel-shaped nematodes. Although they vary in size, those of most immediate concern to agriculturists are one-fifteenth-of-an-inch-long, needle-mouthed worms which feed on the juices of living roots. Professor R. H. Entey of MacDonald College estimates that last year they cost Canadian farmers five percent of their gross income and some agricultural experts suspect that in the past they may have been responsible for the disappearance of entire civilizations.

Not only do they harm the plant by sucking away nutrients, but the holes they make provide an entrance into the root for destructive viruses and fungi which, unable to manufacture their own, are always in search of a protein or carbohydrate molecule to feed on.

The nematodes are attacked by insects and fungi and by adverse weather, but in spite of these and other natural enemies it is not unusual for a billion of them to be in an acre of crop-bearing soil.

A WINTER RESORT FOR APHIDS

Beyond the nematodes are insects. The most familiar one is the ant which, in the course of operating its involved underground system, disturbs the soil, sometimes moving material up from lower layers where the soil is less pulverized and, through the tunnels of its nest, letting more air into the soil. Thus it helps provide oxygen for the respiration of plant roots and micro-organisms.

But this beneficial effect is sometimes offset by a strange and remarkable quirk which prompts ants to move aphids—or plant lice—into their nests where during the winter months they look after them, then in the spring plant them on new roots which the aphids attack.

This behavior does not, however, stem from any concern for the aphids' welfare, but from the fact that ants like the sweet substance excreted by the aphids and so move one of their favorite dishes inside for the winter.

Sometimes living with the ants, other times in colonies by themselves, are tiny (one to five millimetres long), insect-like animals called springtails. (Although they seldom use them, springtails have a pair of tail-like appendages with which they can move by springing.) They live on organic matter—fungi and other organisms—thus helping to break it down.

WORMS, WORMS, WORMS

Perhaps the most familiar member of the living earth society is the earthworm—which populates the soil in numbers as high as two million per acre. Ranging in size from the familiar "fishworm" to some South African varieties which grow to an inch in diameter and more than six feet long, the earthworm casts its way through the soil—moving some of the most pulverized material closer to the surface, letting air into the soil, dragging leaves and other material underground where they are attacked by the bacteria, and also breaking down some organic matter with their digestive juices.

Earthworms drag as much as 20 pounds of organic matter per square yard of ground into the soil during the six months per year that they are active, and turn up between seven and 18 tons of soil per acre.

AIR FOR THE EARTH

Beyond the earthworms are the small, burrowing animals like moles, rabbits and gophers which, although not really members of soil society, affect the soil by stirring up the various layers and letting it in air.

AN ETERNAL CIRCLE OF LIFE

All biological life—along with the electro-atomic activity—contributes to the soil characteristics known as tilth or the way in which the particles cling together to form a "crumb" structure which leaves pore space for water, air and plant roots. Particles may be bound together by ions of nutrient, by a long positively charged molecule of humus (which is partially decomposed organic matter) or by combinations of these. As bacteria break up organic matter, as earthworms move in, as nutrient is returned to the soil system, the balance shifts. Particles change alliances, new crumb structures are formed, old ones break up.

But not only is the soil constantly alive, constantly changing, but the life and activity moves in a sort of eternal circle. The nutrient elements cannot be created or destroyed. If through leaching, dissolving and carrying away by water and plant growth, the nutrient elements were all removed, if microbe activity dropped off and there was no organic matter being returned to the soil, then the soil would be destroyed—in a sense dead. The silicon and aluminum particles would then return to the sea. But even then, over a near-eternity, they would build up, gain new nutrient, new micro-organism life and one day after a long series of geological changes be exposed once more to the air and sun and begin all over again producing life.

When nutrient is replaced through fertilization, the fertilizer comes from some other place on the earth where nutrient elements occur in large commercial deposits formed originally perhaps on the floor of an ancient sea. In other cases the fertilizer may be made from crushed animal bones, which means that nutrient taken at some earlier time from the soil by a food plant, is being returned to the soil.

The plant grows, the roots die—but only in the sense that its cells can no longer reproduce life. It never really dies. The life elements, bound together in their complex molecules are still present in the root, waiting to be freed by the micro-organisms.

Says OAC's Dr. Matthews: "When you consider the complexity of the interrelationships among the various forms of life and motion in the soil—how sophisticated and delicate it all is—it's a miracle man hasn't knocked it out of balance and destroyed it long ago."
THE OLDEST BATTLE

Man pitted against nature—it was over then and always will be

One thing has never changed. Agriculture still is, basically, man against a relentless nature. For all of his science, the elements continue to toy with him and the pests keep coming back.

A statistician estimates that weeds in the west cost farmers $225 million per year. Plant diseases, too, are never really wiped out. Rust, the most dreaded of these, wiped out 100 million bushels of western grain in 1916; seemed to be eradicated in the Forties; then returned with new tough strains.

Grasshopper plagues still recur. The gopher, that buck-toothed plant-eating denizen of the plains, comes and goes in cycles. There are cutworms, wire worms, aphids, weevils, web worms, potato beetles—the list is almost inexhaustible.

And there is weather, which man can so far only passably predict. The drought still comes to turn B.C. pastures to tinder. The wind as always chuckles through the Crowfoot Pass and rumps across the southern prairies, lifting the topsoil. Late frost still nips tobacco in Ontario and the fruit in the Maritimes. Hail comes, as it has always come, with sudden fury to wipe out a year’s hopes in 10 minutes.

The battle is as old as agriculture itself. Man never wins. At best he fights a holding action.
Howard B. Grad, in a study of the effects of music on plant growth, found that plants in a music room grew taller and produced more leaves than those in a control room. He attributed this to the sound of music stimulating the plants' growth processes.

In another experiment, Grad used white noise as a control. The plants exposed to white noise did not show any significant difference in growth compared to the untreated plants. This suggests that the effect of music was not due to a general noise stimulus but rather to specific frequencies.

Grad's work has been replicated by other researchers, who have found similar results. For example, a study by the University of California found that plants exposed to specific frequencies of music grew taller and produced more flowers than those in a control group.

Some believe that these findings could have implications for agriculture, where music might be used to control plant growth. However, more research is needed to confirm these conclusions and to understand the underlying mechanisms.

In conclusion, the effects of music on plant growth are promising, but further studies are needed to fully understand these phenomena. It is clear, however, that the connection between music and plant growth is a fascinating area of research that deserves further exploration.
THE PUSH-BUTTON TEST-TUBE FARMER

by Gordon Wesley

For the past 100 years in the history of man, we entire concourse—this one—consistently has more food than it knows what to do with. More than that, Dean N. R. Richards of the Ontario Agricultural College at Guelph, says that North America could "triple production almost overnight" if necessary.

"Agriculture," adds D. D. Gilbert, New Brunswick's deputy minister of agriculture, "is maybe the most efficient business in Canada."

This efficiency and spectacular production are no accident. They are the result of the most rapid, successful scientific progress in any field of endeavor. Within memory of most of us, farm agriculture was a relatively crude business, governed mostly by luck and brains. But in the last 20 or 30 years there have been advances in genetics, plant breeding, pest control, mechanization, improved food processing and utilization of soil. In short: science has taken over.

Agricultural science, in its broadest sense, means any thing. It means mechanization—-not only the widespread and well-known trend to power machinery but a host of lesser things. Science is a group of Ontario dairy farmers feeding their cows on the advice of an electronic calculator. It compares electronically the cost and amount of feed a cow consumes with the value and amount of milk produced. This service is made available to all dairy farmers by a co-operative organization. Science is a Chilliwack, B.C., dairyman who heats his milking parlor (they aren't called cow barns any more) with infra-red radiant heaters, and a poultry man in the same district who regulates the artificial light in his henhouse with a photovoltaic cell. The cell ensures that the hens get the same amount of natural and artificial light each day of the year, which seems to improve their outlook on life and their output of eggs.

And science is also the Ingersoll, Ont., man whose corn grows in a mechanical backhoe-stretcher, a lazy-Susan with push-button feeding controls and a self-stowing milking parlor with a robot named "UH" (previously "let cows that read")

There are a few of the reasons why the farmer of today can now produce enough food for 27 people, where 20 years ago he produced enough for only 11.

Literally thousands of scientific experiments are going on in Canadian agriculture. Next time you sit down to a meal, consider that most of your ingenuity and scientific research went into the making of it than was ever expended on a rocket to the moon.

The federal government has spent 2,900 agricultural research projects going on. There are many more under the aegis of the provinces, universities and other agencies. Dr. D. N. Henderson, a director of the Ontario Agricultural Research Institute, has said that $30 million is spent on research in Ontario by the provincial and federal governments alone.

These studies cover everything agricultural under the sun. It is impossible to offer a definitive list, but the samples that follow may indicate the variety.

—Why do some plants grow better than others in the same location? The Lehigh Valley federal research station has one fascinating feat: cereals serve two to germinate faster and grow more quickly in a 48-hour period when their long axis and embryo axis are pointed toward the north magnetic pole. Nobody knows why. But if seeds were pointed north by south, and if seeds were pointed to the magnetic pole (by embedding them in long strips of tape), a system already used in research plantings), production might be increased.

—The stibblished is an edible fern that grows wild along river banks in some parts of the country. It is harvested commercially only in New Brunswick. Local housewives use it. Two food processors are marketing it as a frozen product. But the demand greatly exceeds the supply, so the federal government research station at Fredericton is now experimentally growing it elsewhere in quantity on ideal soil.

—How do you pollinate alfalfa where the plant offers no nesting place for bees? At Lethbridge, they are experimenting with man-made nests for bees—blocks of wood punctured with small holes. If the bees take to the nests, the researchers will take the nests to alfalfa and thereby, they hope, settle the pollination problem.

—Science has developed many new varieties of grain in the last few decades—but a better one may be coming up. With some dramatic juggling of chromosomes, Dr. Charles Jenkins, University of Manitoba, is experimenting with a cross of wheat and rice. On limited testing it has produced relatively high yields under drought conditions. Dinosaurs are testing it; it may give us an entirely new flavor of whisky. It has been turned into puffed wheat, with good results. And the new grain, technically known as "Triticum," seems to have great possibilities as poultry and cattle feed. Over an identical period, cattle fed on the hybrid gained as much weight as others fed on a mixture of barley and oats—but on two pounds less grain per animal per day. The cows set this limit themselves; the amount of hybrid grain offered to them was not restricted.

—At present no existing winter wheat can survive a severe western autumn. Again, the University of Manitoba is tackling the problem with cyto genetics—the juggling of plant chromosomes. A successful winter wheat, by growing early in the spring, would help control soil erosion. Scientific pest control is a story in itself (see page 36). It has, of course, vastly increased agricultural production. Research on feed for people (see page 45) is also another entire story. The feeding of livestock is likely to become so carefully controlled as a laboratory experiment.

Florn ready, hay is being experimentally packaged into bits, with vitamins or antibiotics added to feed as food for this machine from a push-button console at a two-way radio set up in their living rooms. AUTOMONIC irrigation could be achieved by inserting moisture-sensitive cells in the soil which would trigger a flow of water whenever the moisture level demanded it. An automatic drainage system could be similarly operated. The engineering for all of this is within our reach; it is simply a waste of time.

If sunshine somehow becomes competitive with fossil fuels, farm machines would run on it. We could also use sunshine for environmental control, such as summer air-conditioning for farm buildings.

Where water is scarce and sunshine abundant, we may see many commercial crops produced in a water culture (hydroponics). There would be no water wastage, as in direct irrigation, or evaporation, as in sprinkling.

The time may come when farmers will operate algae food factories. There is conjecture, but that controlled radiation might be used to kill weeds. Science may even develop the secret of photosynthesis, thereby eliminating the plant altogether from food production. Research is being directed toward the use of the sun's energy directly to produce sugar which could be used as the basis for production of chemical foods. Robert E. Stewart, professor and chairman of the department of agricultural engineering at Ohio State University, told the Review: "The information I have indicates that the 'secret' of photosynthesis is not too far from discovery."

For though it has come, the world of agricultural science is just beginning to hit its stride.
MISS CARSON'S NOT-SO-SILENT SPRING

Yes, Miss Carson, pesticides are dangerous if used improperly. But without them we wouldn't have enough to eat. If only pesticide users would follow the instructions on the label.

LAST FALL a book called "Silent Spring," by Rachel Carson, a biologist-turned-author, became a best seller and a bombshell for the agricultural chemical industry.

Miss Carson's basic thesis is that man is poisoning himself, his food, his environment and countless thousands of harmless fish, birds and animals in his effort to control insects and weeds. More than 500 kinds of pesticides, in the amount of 700 million pounds, were produced in the United States last year. Miss Carson contends that their wholesale indiscriminate use is seriously harming us.

Since its publication, "Silent Spring" has been debated furiously. Conservationists, farmers, sportsmen and just plain citizens are alarmed and frightened by its implications. Professional scientists, well aware of the danger of pesticides before the appearance of "Silent Spring," seem less alarmed, but even they are reconsidering a basic question: Is there, in fact, a serious danger to man and wildlife from pesticides?

It is a legitimate question. The answer would appear to be, yes, pesticides are dangerous, if used improperly. In the Carson book are scores of carefully documented cases of great slaughter of birds, fish and other wildlife by pesticides. The book also contains grim accounts of sickness and death among workers handling the poisons. About 150 people die in the United States every year because of insecticide poisoning.

The figure in Canada is undoubtedly lower and nearly impossible to track down. But deaths have been attributed to careless use of these poisons. And because we use about $30 million worth of insecticides each year to fight such plagues as grasshoppers, scale, blight and mites, we are caught up in the Carson controversy.

Canada is well-policied in this regard. Two federal government agencies, the Food and Drug Administration and the Department of Agriculture, are charged with supervising the introduction and use of pesticides in Canada. In addition, provincial and local agricultural bodies, from government and university, also police the use of pesticides.

The Department of Agriculture must closely examine and evaluate the performance claims of every pesticide before it is introduced for sale in Canada. Food and Drug men have power to seize, examine and, if necessary, destroy any foodstuff that contains more-than-allowable limits of pesticides. Recently they seized a quantity of prairie-produced butter with traces of dieldrin in it. This substance, used in controlling grasshoppers in western Canada, is not supposed to be used on, or near ground used for grazing cattle, because dieldrin can show up in the flesh, milk and butter of cattle exposed to it. Early last summer the federal government was reported to be planning criminal action against farmers who used dieldrin on cattle forage.

Food and Drug sets the maximum levels at which pesticide residue may exist in food without harming humans. These are very conservative levels, says Dr. Henry Hurzig, a specialist in pesticides and an associate director of the Department of Agriculture's research branch in Ottawa. The permissible level is so low, he says, that there is little chance of a public health danger.

"There is a constant watch on this problem," he said recently. "The safety factors are so great that, if pesticides are used properly, we might be accused of being too cautious."

He cites the case of DDT, used in Canada for more than 15 years. Today, almost everyone has some traces of the chemical in his body. Recent tests of some 60 samples of body fat collected across the country, showed DDT in all samples but at levels not considered hazardous by Food and Drug.

Furthermore, he says each new chemical must pass rigorous tests for toxic effects before it is allowed on the market.

"Most important," adds Dr. Hurzig, "all the limits for residues are set on the assumption that the chemical will be universally used." For a chemical used to control cabbage insects in eastern Canada, it was assumed that the pesticide would be sprayed on every cabbage consumed.
in Canada, including imports, and a safety level was set accordingly.

"The chances of a particular food having consistent residues above the safety limit are remote," Dr. Hurtig says, but he adds that improper use can cause problems.

In addition to these inspection and control facilities, Dr. Hurtig points out that Canadians use pesticides on a much smaller scale than do U.S. farmers, mostly because we have a colder climate, a shorter growing season and fewer types of crops and insects. This, too, contributes to safety.

Oil pesticides fit into this picture as the safest killers of certain bugs. Non-poisonous white oils, which are produced as part of the refining process, are effective against mosquitoes, because the oil, sprayed on ponds in early spring, suffocates the larvae. W. G. Evans of the entomology department, University of Alberta, rates the oil spray over chemical poisons, for mosquito control. Larvae cannot develop an immunity to this spray, as they have with chemically-poisonous sprays, and there are no residues or handling problems because of toxicity. Other oil-industry developed sprays—some of three pure oil, some carrying pyrethrum—are being used successfully against microscopic scale, blight and mite in Canadian fruit orchards.

But whether they are oil or chemical, insecticides must be used intelligently, following closely the instructions of the manufacturers. Public misuse of poisons is largely responsible for the many "side-killing," documented in "Silent Spring."

Dr. Fred Bentley, dean of agriculture, University of Alberta, says, "The public, using these chemicals, must show a greater sense of responsibility and intelligence. The alternative will be tighter regulations which might ultimately include the necessity for a licence to apply chemicals."

Dr. Evans does not object to the use of the poisons either but rather to their misuse. He urges that we "develop the attitude of using our heads rather than reaching for a spray gun and pretending that pesticides are the answer to all our pest problems."

Dr. Hurtig adds, "A spray designed for aphids on roses isn't meant for use on tomatoes. You'll find that warning right on the can. But home gardeners go right ahead and spray poison on their tomatoes anyhow, just to save buying something else."

While there is no excuse for careless use, some entomologists feel that "side-killing" on occasion are a necessary sacrifice. A few years ago a Maritime's forest was sprayed with a solution of DDT to kill spruce budworm. The chemical drifted and was washed down into the Miramichi River, killing thousands of salmon. It was a tragedy. But, if the forest had not been sprayed, the budworm might have destroyed it. Then the stream and the fish would have been saved. The fish were replaced relatively soon; replacing a forest takes nearly a hundred years.

There is, however, a middle road—a form of "integrated" control. It involves putting on insecticides of the right kind in precisely the right quantity at the right time to kill undesirable insects but not their natural enemies. It requires the advice of trained specialists, research on selective insecticides and fungicides for the region concerned and reservoirs of unsprayed crop or countryside to produce predators.

Beyond that, some naturalists are pressing for completely "natural" or biological control: the use of natural enemies of pests, including parasites, predators and diseases. In the U.S. they controlled the Japanese beetle by introducing a disease of the beetle's larvae. There, too, horticulturists can buy "Bacillus thuringiensis," a disease that attacks certain fruit and vegetable insects without harm to the plants.

Canada is one of the world leaders in the study of biological control of pests. The Department of Agriculture Research Institute (for biological control) at Belleville, Ont., has been experimenting along these lines for years.

Currently studies are being made on an insect that preys on the Canada thistle; high frequency sounds that banish corn borers from corn fields (because, to the bugs, the noise resembles the sounds emitted by their natural enemy, the bat); sounds that lure mosquitoes to death traps; ultrasonic vibrations that kill mosquito larvae in water; nematodes, a group of thread-like worms of which one species preys on such pests as mosquitoes, black flies and grasshoppers. Nearly a billion beneficial insects provided by the institute have been liberated to attack pests in Canada, and consequently about 12 species of pests have been wiped out or rendered relatively harmless in 30 years. One is the spruce sawfly which has destroyed over 10,000 square miles of forest on this continent; it's been kept down to modest numbers since 1945. Biological agents have also controlled the woolly apple aphid and the apple mealybug in British Columbia and Nova-Scotian orchards.

Natural controls have the advantage of being highly selective. They seek out and kill only their natural targets. They are not harmful to other living things. They multiply and spread by themselves and always retain their potency, factors that chemical pesticides do not have. Nor can the insects build up resistance to the natural enemies, as they have done in the case of many chemicals.

The time is not yet here—if indeed it will ever come—when biological controls are sufficient in themselves. Most scientists feel that the solution lies in a combination of biological control and some use of pesticides. Certainly there is no doubt that man's battle with the bugs must continue. Dean Bentley of U. of A. says flatly, "We could not produce sufficient food to meet the needs of Canada from the present acreage if we were to discontinue the use of agricultural chemicals."

And Dr. N. D. Holmes, head of the entomology section, Lethbridge research station, says, "We are only holding our own in the fight against most insects. We must have new insecticides. They must not leave poisonous residues nor destroy beneficial insects and wildlife. More varieties of crops resistant to insects must be developed. New methods of control must be devised."

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EPITAPH FOR AN OLD FRIEND

For years that durable cliché, the country grain elevator, has endured as a symbol of Canadian farming. Amateur artists have relentlessly painted it; poets have lampooned it; homecoming authors have viewed it with tears. The elevator has borne its shoulders against all the onslaughts of man and weather. But now, like so many institutions in agriculture, it is becoming a casualty of change.

There are still 3,200 grain elevators in Ontario and the west, but 270 have closed in 10 years. Many more will go. More than half of the total is in Saskatchewan where, last year, the railways were studying the possible abandonment of 53 branch lines. When the trains stop, the elevators are stranded. Some will continue to move their grain out by truck. A few have been hoisted and moved. But the trend is to fewer, bigger, centralized terminals. And to farmers, it is like the passing of an old friend.
A PARTNER NAMED PETROLEUM

Without it, there would be no agriculture as we know it. Fertilizers, machinery lubricants, plastic films for wrap, plastic equipment, fuel for heat and power—petroleum supplies them all. Some day you may use it.

The oil industry supplies over half a billion gallons of gasoline and diesel fuel to Canadian farmers every year. This is the most visible, most easily understood aspect of the long-standing petroleum-agriculture partnership, but it is only one aspect. In literally hundreds of ways, every day of the year, oil companies are serving Canadian agriculture.

For example, in 1962 Canadian farmers spread 1,444,000 tons of fertilizer—much of it the chemical kind containing nitrates and using, at one stage in the preparation, hydrogen. Some of the hydrogen came from oil refineries as a by-product of the crude oil refining process.

When you last bought a turpentine or a small rose bush, did you have a protective wax coating? If so, the wax came from an oil refinery. In Ontario alone, 750,000 pounds of wax are used annually for turpentine coating. Refinery-produced wax also protects chere wedges and covers cardboard milk cartons.

Buy a package of Canadian-grown tomatoes during the off-season. They may have been grown in a greenhouse stretched in transparent polyethylene film. Made from ethylene, one of the hundreds of petrochemical products derived from petroleum, polyethylene is perhaps the most popular plastic used on farms. Polyethylene pipe for livestock watering is cheaper than metal pipe, is easily handled and can be rolled up and stored in a small space during the winter. Polyethylene bags, for chemical fertilizer, are lightweight, tough, waterproof, and can be stored outdoors without cover.

Scientists in Nova Scotia have recently increased the yield of experimental potato crops by using polyethylene film as a mulch. It covers the room of the young plants, retains moisture and heat and excludes weeds by blanketing out the sun. Only the desired plants can grow through the tiny holes cut into the film for that purpose. Similar experiments on tomato plants look promising, and, in the southern U.S., miles of the shiny film are in experimental use on cotton crops.

Oil, of course, is used in more direct ways on Canadian farms. Perhaps the greatest single contribution made by the oil industry since World War II has been in the field of lubrication. Modern farm machinery now includes complicated, powered systems for closing barns, feeding and milking livestock, grinding and feeding feed. Mechanization, for example, makes it possible now for one man to feed 10,000 laying hens and collect their eggs.

All these machines use lubrication. Many are fuel. Each year the farm market in Canada then seems with about 12 million gallons of automotive oil and nine million pounds of grease. To help with the lubrication Canadian in 1960 introduced farmers in a grease cartridge—a packaged container which, in conjunction with a specially-designed gun, masks the job of greasing machinery quicker, easier and less messy.

Farmers, who have always been adept at inventing innovations, have come up with some new uses for oil themselves.

For instance, in the Maritimes where blueberry farmers must burn off old bushes to stimulate new growth, they use Canola oil. This was scarce and expensive. The farmers turned to a fuel-oil burning apparatus, invented behind a tractor. The old blouses given the fast hot fire required to get rid of the old growth and, at the same time, stimulate the growth of shoots, the long, underground stems of blueberry plants.

In British Columbia, one fruit grower is experimenting with natural gas heating to protect his orchard from frost. In certain ground temperatures five degrees within 30 minutes on a still night.

In Quebec, another farmer is using quarter-inch plastic pipe to collect sugar maple sap, and what is virtually a 30-foot pipeline. The Site more from tree to tree in one continuous flow. The natural force of the sap drives it through the 50-foot pipeline. The process is old, the kind of pipe is new.

Another plastic from petrochemicals made an impressive debut in western Canada this year as a pick-up tooth for grain-harvesting combines and hay balers. It’s Imperial’s “Fierce-Tooth,” which costs less to replace than a steel tooth and, because it’s flexible, tears fewer stalks into the machinery. A field test before it was leased on the market showed that the new teeth picked up half as many wheat-sized stalks as steel, and less than one-tenth as many large ones. Farmers saved with steady grain didn’t weep at the taxes. In 1961 3.5 million bushels of grain in Canada were downgraded by government inspectors because of too many small or too large. Nobody knows how much it cost the farmers concerned to devalue their grain—or how much change had been done to the harvesting machinery by the stones jamming through.

There’s an outside chance that one day the oil industry might get even more deeply involved in agriculture—by literally producing food. Already Esso Research in Lin- dora, N. J., is testing feeding animals with a nutritious food supplement from crude oil. The white powdery container all the amino acids known to be essential for animal or human nutrition, plus a high amount of vitamin B. Its tasteless but flavoring could be added.

Bacon and oil, anyone?—by Jack Fall.
THE HIRED MAN

by W. O. Mitchell

Many years North American dis not seem to persist much beyond five decades. Stock no longer the hilly prairie fields in fall. Except on foothills ranches, the saddle horse belongs now to the show ring, the parade, the trail ride. The great-rumpled farm work horse is gone forever, his departure accomplished by the tractor, the truck, the combine.

With the increase of farm mechanization there has come a more recent casualty and of them all it seems the most shocking disappearance from the western landscape. Like the topsoil of the dirty Thirties, the hired man seems to have drifted away.

When he flourished, he came from everywhere: Russia, Poland, Hungary, British Isles, the Scandinavian countries; his blood line roved the world. Whatever his genesis he always seemed to be long and lean. Perhaps this was an optical illusion, since I recall him mostly from the low vantage point of a boy. As well, he always seemed to smoke vaguely somewhere between the ages of forty and fifty. He was not to be confused with the seasonal and itinerant spadefuls, field pitchers, skinners, stockers, hired for the harvest weeks. He was a man who had joined the farm. In the first two decades of this century he worked for forty to fifty dollars a month until the Depression when his wages were room and board and five dollars a month—or simply room and board.

Like his employer he was a jack-of-all-trades: blacksmith, mechanic, horse trainer, carpenter, concrete expert. When the summer season strunged in Spring and the gulls and killdeer swung low behind him, he seeded other men's crops, hayed other men's fields, milked other men's cows, plowed other men's gardens. He doctorored horses, halter-broke colts, slept generally in a bunk-house, ate his meals with the family.

I can recall a number of hired men: Allan, a hard-drinking tobacco-chewing Peter Pan with a wild, pale-blue eye, a leather neck creased as though someone had pressed chicken wire against the skin, his face turkey red to the line of his hat—from there up: mushroom white. There was Ben, non-smoking, non-drinking, non-smocking Pentecostal with a passion for Maple Bud caddies, working out endless problems at noon and suppertime: how many grains of wheat laid end to end to stretch from the corner of the chop house to Spafords' north granary—eight million six hundred and eighty three thousand two hundred and fifty one—a surprisingly small number of wheat kernels to reach the corner of Spafords' granary now I think back on it.

The hired man was a sort of muscular yardstick; a boy measured himself against him. He was another sort of yardstick too; if a man had an unusually large turnover of hired men, the community soon guessed that the farmer was: (a) stingy (b) bad-tempered (c) married to a wife who couldn't cook good for a bear.

Generally it was the hired man who seated a .22 rifle properly against a boy's shoulder and showed him how to squeeze the trigger to touch off a gopher. He perhaps was able to tap a willow stick with a jackknife handle to loosen the bark so it would slip free for a whistle, make a minnow net from an onion sack, a pine lore from a shot horn. A hired man might teach a boy to play rummy or heave or cribbage or Split-in-the-Ocean, help him to fill out a form to send away for itching powder, sneezing powder, Ventrilla, a Ten-Thousand Dollar Contest. It was most likely his fine-cut that was smoked for the first time behind the barn. His contribution to colorful language would be hard to assess: "enough to give a gopher the heartburn," "s/he could eat pumpkin through a wove wire fence," "beef to the beets like a Muslingar heifer:"

Men who could play a mouth organ made good hired men. When I visited on a farm near Mansor, Saskatchewan, at the age of twelve, I met Jeff, from the north of England; he could pick a sweet mandolin for: "Where Do The Flets Go In The Winter Time?" "Roses In Picardy," "Marcheta." This extra fine rapport between hired man and farm boy did not mean that prairie fathers were relics in their parental duties; it was simply that most hired men seemed to have one foot in the adult and the other in the boy's world.

It may have been mechanization that killed him. He is not around any more for the farmer who can afford to pay a hundred and twenty-five dollars a month and board and room. Perhaps a fair proportion of hired men went on to acquire their own farms in time. No new ones have stepped forward and it is small wonder, for the job has no minimum wage, no pension or retirement fund plan. The hired man does not qualify for unemployment insurance. He must be busy somewhere making the tractors and the trucks and the machinery and the combines that killed the horse—and him.
CAN WE FEED THE HUNGRY HALF OF THE WORLD?

A Challenge

by Dr. Rolland Poirier, agronomist

Dean, Faculty of Agriculture
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The scandal of our century is this: humanity is divided into two halves. The first half has all the tools to produce food in abundance and must at every moment resolve sharp problems of overproduction. The other half does not always receive the minimum rations necessary to sustain human life. Due to distances or seemingly unassailable political frontiers, humanity hasn’t been able to remedy this scandal. Now, however, modern transport and food conservation have reduced distances and intercontinental food-producing is becoming a reality.

I think the solution to this problem may come in our lifetime. More than that, I think that very soon we may see competition between Russia and the West—a severe competition to feed the hungry half of the world, just as there is now competition in outer space.

But let us suppose that the problems of transport and political barriers are overcome. Are we equipped to feed the rest of the world? I think not. Before we can begin to attack this problem in a practical way the world will need a very great many more professional agriculturalists. I believe that the agriculturalists must redefine their job and broaden their outlook. He must become a specialist for human feeding.

We must have better-trained producers, because one day we will be asking people to produce more food, not less. If we were to meet only 20 percent of the food requirements of the hungry part of the world, Canada and many other countries would have to increase their actual production. We must graduate from our universities men who understand all the aspects of food processing, biochemical as well as technical. While attacking quantitative problems on human feeding, in many countries we must also attack the qualitative problem. This may even be necessary in some of the so-called “well-fed” countries, like Canada, where, on the two sole practical criteria of choice seem to be “flavour” and “satisfaction.” As far as quality is concerned our domestic animals are a great deal better nourished than we are. (The nutrition division of the federal department of health and welfare reports that, on the average, Canadians consume much more of every nutrient than they need and yet some, among families of all income levels, consume too little of various nutrients.)

This is not a question of trying to invade the fields of the dietician, the doctor, or the chemist. It is, rather, a broadening of the field of the agriculturalist so he can work with others to meet the challenge of feeding an ever-growing world population. Agriculture has been kept in a sphere by itself too long. It must now come out of its shell and join the world. Society must know that by helping agriculture, we are helping to improve our own nutrition and are beginning to solve the problem of feeding humanity.

During the last war a good part of the world looked with pride at Canadian agriculture because we were helping to feed the Allies. Let us now go on record as saying that we are working toward the task of feeding not the Allies but the hungry populations of the world. As a practical first gesture, let Parliament divert 10 percent of its present defence budget to this new task. It would also be practical disarmament.