Swift Current Research Station

1920-1985

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Swift Current Research Station 1920-1985

Mark R. Kilcher

Research Branch
Agriculture Canada
Historical Series No. 25
1986

One hundred years of progress

The year 1986 is the centennial of the Research Branch, Agriculture Canada.

On 2 June 1886, *The Experimental Farm Station Act* received Royal Assent. The passage of this legislation marked the creation of the first five experimental farms located at Nappan, Nova Scotia; Ottawa, Ontario; Brandon, Manitoba; Indian Head, Saskatchewan (then called the North-West Territories); and Agassiz, British Columbia. From this beginning has grown the current system of over forty research establishments that stretch from St. John's West, Newfoundland, to Saanichton, British Columbia.

The original experimental farms were established to serve the farming community and assist the Canadian agricultural industry during its early development. Today, the Research Branch continues to search for new technology that will ensure the development and maintenance of a competitive agri-food industry.

Research programs focus on soil management, crop and animal productivity, protection and resource utilization, biotechnology, and food processing and quality.

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Preface

Gary Fairbairn, author of *From Prairie Roots*, wrote: "No book can please everyone—a history that tried to be pleasing to all would probably be satisfying to none." He went on to say that "a comprehensive, academically definitive history...would take volumes and would be read by very few members of the general public." He contended that a short, simple narrative approach would prevent "the dead, lifeless summary that usually comes from committee-directed official histories." The history of the Swift Current Research Station is an attempt to follow Mr. Fairbairn's advice.

Any author has to be allowed some liberties within the confines of factuality. One obvious liberty I have taken is to refrain from attempting a complete list of all people who ever were or are now working at the Swift Current Research Station. The task would have been impossible.

The station was set up to do research on agricultural problems and to provide information that would ultimately be of lasting value to the agricultural industry, both in the immediate vicinity of southwestern Saskatchewan and on global proportions. The purpose of this history is to summarize accomplishments of the station and progress made toward meeting its goals. This summary approach should not be viewed as diminishing the vital part played by each individual during the life of the institution. The organization would fall apart without the expertise and dedication of everyone involved.

Therefore I would like to take this opportunity to acknowledge those skilled crafts people, farm workers, technicians, office support staff, administrators, and scientists who have gone unnamed. Your valuable contributions are recognized and appreciated.

M.R. Kilcher

Foreword

The Swift Current Research Station was established as the "Dominion Experimental Station" in 1920. Its role was to "discover suitable cultural methods and cropping systems for the dry areas of southern Saskatchewan and Alberta." The decision to establish an agricultural research facility in this region was precipitated by the severe problems of drought and wind erosion, the latter problem being aggravated by some of the farming methods used by producers.

In the 65 years since the research station was established, through their initiative, hard work, and dedication the staff has introduced new crops, bred improved varieties of cereals and forages, developed agronomic packages for these crops, improved farming methods that help stabilize and ensure production and conserve moisture and soil, and developed equipment that permits more efficient use of time and resources to carry out research. The results of this research have also served as the basis for recommendations for more efficient utilization of cereals and forages in feeding cattle, poultry, and sheep. The adoption and effectiveness of our research findings and recommendations over the years are amply reflected in the ability of most producers in southwestern Saskatchewan to achieve reasonable yields of cereal crops in 1984, despite drought conditions similar to those of the Dirty Thirties.

It is difficult to know the best approach to take in writing a history of research. People, activities, and achievements are all tremendously important. An earlier history of the first 50 years of the station's activities, published in 1970, was prepared by J. Baden Campbell. However, since this new history was to be specially prepared for the celebration of the Centennial of the Research Branch of Agriculture Canada, we decided to present the achievements of the station made since its beginning, even if this approach meant overlapping the history published earlier. For those who wish additional details on the activities and the people involved, particularly in the establishment years of the station, the history prepared by J. Baden Campbell provides interesting reading.

This new historical accounting describes the increasingly complex and sophisticated nature of research projects at Swift Current over the years. The tremendous increase in published information from the station reflects the scope of this research. Publications on new discoveries that help make the agricultural industry more productive and efficient have been disseminated to producers, the scientific community, provincial extension workers, agribusiness fieldmen, all types of media, and the urban public. The need to carry out basic research to find meaningful answers to difficult questions has led to the replacement of some researchers having a general background in agriculture by others having specialized training. With this increasing sophistication has come an increasing national and international recognition of achievements from this station. Staff has become more and more involved in the global agricultural community through conferences, visits to other countries, training of scientists and technicians from other countries, and participation in Canadian-sponsored cooperative projects abroad.

Although the achievements reported here result primarily from the efforts of the station staff, progress could not have been as rapid without the invaluable cooperation and assistance of many other individuals and organizations. Some of these, such as the Prairie Farm Rehabilitation Administration and certain provincial government agencies, are mentioned in the text. Others that should be recognized for their valuable assistance are producer organizations, individual producers that participated in illustration station and substation projects, and agribusiness organizations. These groups have also provided valuable avenues for transferring information to producers. Scientists at other establishments of the Research Branch of Agriculture Canada, who have kindly supplied us with information from their work, have also been a vital link to the high level of achievement reached by the Swift Current Research Station. Their contributions are recognized and greatly appreciated.

The author, Mark Kilcher, became a nationally and internationally recognized authority on forage production and on pasture and rangeland management during 32 years of research at the Swift Current Research Station. We believe you will find his version of the progress and achievements of the station to be readable, interesting, and informative.

D.M. Bowden
Director
Swift Current Research Station

Dr. Dave Bowden
Director
1983–1985

About the author

During his career with the Agriculture Canada Research Station at Swift Current, Mark R. Kilcher became recognized as a prominent forage agronomist in western Canada, an active professional agrologist, a prolific writer of scientific papers and popular articles, and a productive research scientist.

Mark was born and raised on a livestock farm at Daylesford, Sask. He served 3 years in the Royal Canadian Navy as a radar operator during World War II, in both the Atlantic and Pacific commands.

Mark attended the University of Saskatchewan from 1945 to 1949 and worked for the Research Branch of Agriculture Canada at Swift Current until June 1982. While at the station he studied various aspects of range management, cultivated forage crop agronomy, pasture management, and complementary grazing systems for cultivated pasture and rangeland utilization.

The author of over 40 research papers and over 100 miscellaneous articles, proceedings, and bulletins, Mark most enjoyed his participation in producer-oriented meetings, courses, and workshops. Since retirement, he continues to write for farm and ranch readers and is often requested to speak at livestock and forage crop events.

Mark has been active with professional associations. He served on the senate of the University of Saskatchewan for 6 years, was associate editor of the *Journal of Range Management*, and served on the Saskatchewan Forage Crops Advisory Committee. He has been president of the Saskatchewan Institute of Agrologists, a director of the Canadian Society of Agronomy, a member of the executive of the Northern Great Plains section of the Society for Range Management, and a founding member and director of a producer forage association in southwest Saskatchewan.

During his career with Agriculture Canada, Mark received a national research award from the Canadian Society of Agronomy, the Merit Certificate Award from the American Forage and Grassland Council, the Distinguished Agrologist Award and the Recognition Award from the Saskatchewan Institute of Agrologists, and a fellowship from the Agricultural Institute of Canada.

Combining this wealth of experience and personal knowledge with an in-depth study of the historical facts about the station, Mark Kilcher provides you with an interesting and informative history of the Swift Current Research Station.

CHAPTER 1

In the beginning

Mark Kilcher
Forage Agronomist
1949–1982

The Swift Current Experimental Farm, officially recorded as the Dominion Experimental Farm, Swift Current, Sask., had its start in the fall of 1920. Its primary function was to study, try out, and compare methods of farming most suitable for the dry prairie region of southern Saskatchewan. Inherent in this broad objective was to determine the suitability of the cultural methods, crops, and cropping procedures for the area.

Its differences were what made Swift Current the choice for a new experimental station. The climate and soils at Swift Current were different from those at the earlier established experimental farms at Indian Head, Sask., or Lethbridge, Alta. And, of course, the locale was quite different from that of the parkbelt and wooded regions in the more northern portion of Saskatchewan, where already there were experimental farms at Scott and Rosthern. The Swift Current location is almost in the center of the Brown soil zone occurring in the province, whereas the earlier-created experimental farms were located to serve agriculture in the Dark Brown and Black soil zones of Saskatchewan.

The reasons forwarded in 1920 for choosing this particular section of land as the farm's site seemed persuasive. Often thereafter, however, researchers wanting a uniform soil resource for controlled experiments questioned the initial choice. But the variation in soil type—clay soil, sandy soil, and loam soil all in one section—was then thought to be desirable. In addition, the site, Section 29, Township 15, Range 13 W3M, was historical school land that could be transferred from one federal department to another without requiring land purchase money or without disrupting other land owners. A further reason for its choice was its proximity to the small agriculturally oriented city of Swift Current, where supplies, services, and trade were accessible. Transportation was also available, provided by the principal mode of the day, the transcontinental line of the Canadian Pacific Railway. Commercial airlines or transport trucking were not even imaginable in 1920. The eventual coming of the Trans Canada No. 1 highway has, however, turned out to be a big plus for this area.

It seems absurd now to consider that the then Dominion of Canada in 1920, after some debate in the House of Commons, had to approve the provision of $15 000 "to establish an Experimental Farm at Swift Current, Saskatchewan." But this small sum was enough to start up a thriving research center.

The $15 000 provided for the purchase of building material for construction of a combined small house and office building, a barn, a shop, and some fencing. During this acquisition period in 1920 affairs of the experimental farm at Swift Current were directed by the superintendent of the experimental farm at Indian Head, Sask. This arrangement continued until J.G. Taggart was appointed superintendent of the Swift Current Experimental Farm in October of 1921.

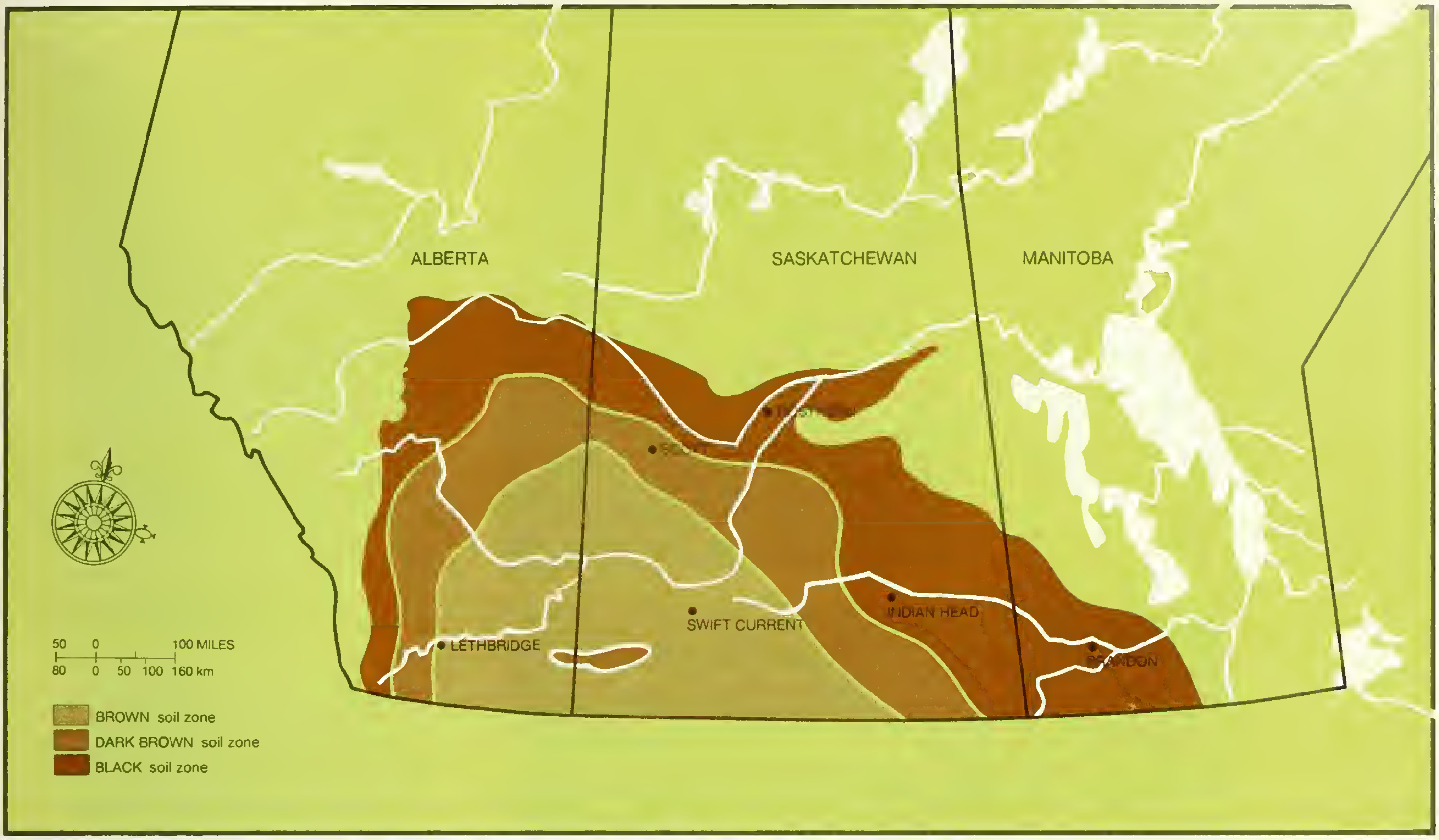
Taggart's first report to the Minister of Agriculture showed that 460 acres (186 ha) were broken in 1921. This breaking was done with a two-bottom moldboard plow pulled by a small steel-wheeled spade lugged-tractor. Taggart also reported that the first seeding of oats was done in 1921 on 25 acres (10 ha) of early breaking. This crop, we can surmise, was to provide for winter feed for the farm's 10 horses, 2 colts, and 1 cow and calf. About half of the horses were a gift from the Indian Head farm. By fall, all of the broken land had been disced and put into acceptable condition for seeding of crops in 1922. Forty acres (16 ha) were fall-seeded to winter rye.

To help appreciate today what $15 000 could do back in 1921, the cost of land breaking and subsequent discing and preparation in those days was about $20 a hectare. Undoubtedly, there were other costs, but how do you measure the value of blood, sweat, and tears?

Besides this land breaking in 1921, the building supplies referred to earlier were converted into the house, barn, and fences. The water supply was provided by a new well.

Besides the superintendent, total staff by 1923 consisted of J.K. McKenzie and Harold (Shorty) Kemp, who were aided by a few hired hands to handle the horsepower chores and fencing.

Those first appointees, Taggart, McKenzie, and Kemp, constituted the professional staff of that era. None held a Ph.D., but the organization was not then set up to utilize highly specialized people effectively. What the new farm needed was what they got—people with imagination; dedication to hard work and long hours; and an ardor for planning and achieving.



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The Palliser Triangle. The contour lines define the extent of the soil zones in this region. Locations are shown for the experimental farms in western Canada when Swift Current was founded in 1920.

A glance at the directory for the administration and professional staff in 1921 (*left*) and 1985 (*right*) shows how much the station has grown.

CHAPTER 2

The first decade—the 20s

In those early days the initial purpose of an experimental farm was as much to demonstrate as it was to make new discoveries. New methods being promoted by industry needed to be tested to see how useful they would be within a specific region. The young farm at Swift Current assumed that responsibility for the southwestern prairie area of the Palliser Triangle.

First plots seeded

The first experimental and demonstrational plots were seeded in 1922. They comprised 40 acres (16 ha) seeded to different varieties of cereal, forages, and horticultural crops. This research was not sophisticated plant breeding with the parameters of measurement and experimental field designs that we know today. However limited the scope of research during those first years, it was sufficient to allow the farm to assess and recommend which of the crops then available were most promising for the region and what varieties of these crops were the most suitable.

By 1924 field test design was improving. Each crop entry within a comparative test was being replicated at least three times. Statistical analyses of the measured results was still not being done, but the average of three values is more precise than one measurement taken from one plot.

Testing new machinery

The new experimental farm also played an important role historically in gaining the farmers' acceptance of new machinery. The station was not designing and building these machines, but it was in a position to obtain them, evaluate their performance, and make recommendations.

One example was the successful introduction of the combine harvester. The story that Grant Denike of the Swift Current Experimental Farm brought the first combine to western Canada is not entirely accurate. In 1909 two farmers, Shand and Edmonds, were using a combine harvester

above
The office and administration building in 1921 (*above*) was the forerunner of today's main research building (*below*) housing administration, offices, laboratories, library, drafting and photography studios, environmentally controlled growth rooms, and greenhouse–headerhouse facilities.

below opposite page
First soil breaking and land preparation in 1921.

at Spy Hill, Sask. In 1912 three farmers near Tilley and Strathmore in Alberta were also using Holt combines. But these machines were not generally accepted in this area then. The Massey-Harris machine company had by 1922 come out with its latest model, the M-H No. 5 reaper–thresher. They were lending these machines to selected farmers for testing and demonstration. The Swift Current farm got one in 1922. Staff tested it for 5 years and reported on its performance. The experimental farm can rightfully claim that it was among the first to demonstrate the usefulness of the combine, the machine that was eventually responsible for the harvesting revolution of the late 20s and early 30s. Likewise, the farm was among the first to test the harvesting swather and barge, and subsequently, to recommend their use.

Testing poultry

By 1926 a poultry testing and evaluation program was started. Breeds of chickens were being compared as to their suitability and production. This program was not intended to produce new breeds but to sort out and compare the breeds then available. The Barred Plymouth Rock was among the favored breeds at that time. Farmers could not be expected to do these types of evaluation. They were too busy trying to make a living to be able to run a nonmonetary experimental venture. They are still in the same situation today.

Conserving moisture

One of the most basic and important research projects that was started in the mid 1920s was the soil tank studies. Leading soil scientists such as Sidney Barnes from Ottawa were assigned to Swift Current to determine how crops used water in the dry prairie region. Plants were grown in soil tanks 1.5 m deep and 0.5 m in diameter, sunk in casings. Overhead rails with suspended traveling scales were used to lift the tanks enough to obtain a measure of the soil weight as crops grew. Changes in weight enabled scientists to monitor the use of soil moisture by crops through the growing season. Soil testing and measurement of moisture levels may now seem to be standard procedures, but the sophistication of today owes much to the illustrated benchmarks established in that early era.

above
Some plots in the early 1920s.

These early studies on soil moisture and crop water use showed that during the 20-month fallow period (from after harvest in any year, through the whole fallow the subsequent year up till seeding time in the next year) only 21–24% of the total recorded precipitation was stored in the soil. These figures have changed little since that time. For each kilogram of wheat grain harvested, 1358 kg of water is transpired in the wheat–fallow rotation, but over 2016 kg is transpired when the rotation is wheat–wheat–fallow. Results showed that it was weed control, and not the dry-mulch practice, that conserved moisture. Careful cultivation reduced the cost of summer-fallow to about 80% of the cost by traditional farming. Throughout the area, the cost of growing wheat was $35–60 a hectare. The higher cost was incurred when wheat yielded 2.7–3.4 t/ha (40–50 bu/acre), because harvesting and threshing were costly operations.

Rotations established

Other studies showed that the wheat–fallow rotation was better for dry years, though the wheat–wheat–fallow rotation was more productive when precipitation was above average for three successive years or more. Longer rotations that included cereals, grasses, and row or root crops were unsatisfactory. All cultural practices were cost accounted. The cost of cereal production on fallow, including costs for labor, machinery, and land, was about $20 a hectare. The wheat–fallow rotation from 1922 to 1929 netted about $7.50 a hectare, but the wheat–wheat–fallow rotation provided a net income of about $12 a hectare. The advantage of the 3-year rotation was obvious, not only because the annual precipitation was well above average in the 1920s but because the soil was new and fertile.

Improving crop management

Tests with commercial fertilizers were started in 1926. These were conducted on the experimental farm and on selected producer farms in the district. Triple superphosphate, ammonium phosphate, and ammonium sulfate were the only fertilizers available. On heavy clay soil, where there was an adequate moisture reserve, the application of 27 or 54 kg (60 or 120 lb) of triple superphosphate increased yields by 0.5 t/ha (8 bu/acre). But these rates of application gave no response by wheat grown on stubble in a wheat–wheat–fallow rotation or in a wheat–fallow rotation on sandy loam soils. Fertilizer applications advanced maturity, improved stands in fields affected with wireworms, and helped to control weeds; but they did not affect the milling quality of the grain.

Though studies on fallow substitutes were considered important, results were disappointing even under the most favorable climatic conditions. Corn, sunflowers, peas, potatoes, and millets were grown as fallow substitutes, but wheat yields were usually low in the following crop year. The experimental farm also grew cereals in two- or three-adjacent 15-cm rows with a fallow strip of 2–2.5 m between. Weeds increased no matter which fallow substitute was tried, and on occasion the weeds grew so prolifically that fallow substitutes were total failures. Conversely, a failure of the fallow substitute crop often resulted in a high yield of the succeeding wheat crop, sometimes as high as that after fallow. The results were so confusing that the logical recommendation was not to attempt fallow substitutes until further studies were done.

Crop introduction

As with machinery, new crops, at least new to the region, were being brought to the experimental farm for testing and evaluation. Different species, varieties, and strains were included in comparative plot seedings. Thus, Marquis wheat was excelling, and Banner and Victory oats and Trebi and Hannchen barley were being recommended. Dakold fall rye became the popular variety and Common flax retained its throne. Mindrum and Kubanka durums were just being tested in the 1920s but were not considered as acceptable as was spring wheat then.

Forage crops, both annual and perennial, were first being compared in this first decade of the farm's expanding existence. At that time, little was known about forage crops except that oats was a reliable crop for stored feed and that crops like timothy grass was, by tradition, a preferred horse feed. Nostalgia, the old ways, and how one was raised undoubtedly tag along with people when they emigrate to a frontier region. Homesteaders and new landowners from eastern Canada, the United States, European countries, and other parts of the old world made up the farming populace. In no time the next generation started taking over. Not surprisingly, then, crops like corn, clovers, sunflowers, and, of course, timothy grass were the old standbys. The experimental farm tested these crops, as well as others such as brome, alfalfa, and western ryegrass (slender wheatgrass), to help sort out their value for the area. Timothy did not fare well in this semiarid region, nor does it today. Bromegrass followed by crested wheatgrass were pinpointed as the better grasses of the time. Grimm alfalfa was identified as the best variety then and was soon to be followed by the variety Ladak. Recommendations regarding crop species and varieties went out to producers. The farm helped to identify the varieties that were adaptable under the region's climatic conditions and separated them from those that were unacceptable, doubtful, or at best risky.

Expanding operations

The Roaring Twenties was a memorable period in many areas of endeavor, including the arts and music industry, the financial market, and commercial trade. Agriculture was equally as buoyant. The new experimental farm at Swift Current didn't escape this growth swell. By 1924 the diversified soils and the valley location of the original section of land purchased for the farm had proved to be not sufficiently representative of the surrounding farming area. Consequently, a half section of adjacent benchland was rented for larger field-scale cultural and machinery trials. Then, in 1928, another half section was purchased for eventual irrigation and pasture studies.

The building program was well under way by 1926. Five houses, a large horse and cattle barn, upright and trench-type silos, several granaries, an elevator with a cereal building attached, straw sheds to house steers, a small shop, and several chicken runs were completed. The building area was landscaped, other plantations were set out along the roads, and the planting of shelterbelts to enclose the garden and orchard was begun.

The mid 1920s saw some of the first signals of the growth that was to come. Professionals like L.B. Thomson and S.E. Clarke were added to the staff in 1926, even though most of their work was conducted at the then Manyberries Range Substation in Alberta.

Other responsible and well-organized personnel got their start in the 20s. People like M.C. (Corny) Smith came on force. Corny Smith was to become the very capable farm crew leader who served the station for decades. Then there was Archie Budd, who always referred to himself as a remittance man who would have been a dismal farmer. He started as a soils technician in 1926 but is now remembered as the self-made botanist who started the original plant collection that evolved into the current herbarium at Swift Current, one of the largest and most complete collections of native vegetation cataloged in western Canada.

Considering the small staff in those first few years, some of the statistics from that period are revealing. A 5-year field rotation

above
A sheep herders' camp.

below
A field day in the 1920s.

A harvesting revolution came about in the late 1920s.

cropping was started in 1922. A 7-year rotation followed in 1923. In 1923, 14 varieties of potatoes were compared, as were 12 of wheat, 19 of turnips, and 12 of mangels. In 1924, 55 varieties of corn were examined and measured, as were 21 varieties of cabbages and 29 varieties of tomatoes in 1925.

Bear in mind, as the early reports attest, these studies were in addition to and not in place of foregoing rotations and crop studies.

Varieties of wheat being compared in the mid to late 20s will ring a bell with oldtimers and students of history. They included among others: Marquis, Ceres, Reliance, Garnet, Red Bobs, and Red Fife.

Recording progress

Records kept were unbelievably detailed. Data included, for example, the annual number of eggs incubated and the number of eggs each hen laid. Perhaps it would surprise you that in 1927 1897 eggs were incubated or that in 1926 the high individual pullet egg-laying performances were recorded as 277, 277, 261, and on down to 207 eggs per bird.

We sometimes tend to take our current level of knowledge for granted. The breeds, types, crops, and varieties and their adaptation and production limits have been sorted out for us today. The number of tests done in the 20s to obtain this information staggers the imagination. Literally dozens of varieties or strains of the following crops were examined and compared: wheat, oats, barley, rye, corn, sunflowers, swedes, sugar beets, mangels, turnips, kale, peas, flax, winter wheat, bromegrass, timothy, clovers, alfalfa, bluegrass, ryegrass, cabbages, potatoes, beets, carrots, parsnips, tomatoes, radishes, squash, Swiss chard, celery, onions, muskmelons, pumpkins, and fruits of all kinds.

After its first decade, the new experimental farm may not have made its mark on an international scale nor even much of a dint as a national institution. No world-shaking scientific papers were published, no world-famous scientists or foreign agricultural groups were beating a path to Swift Current. More important at that time was the contribution the experimental farm made to the farming industry in the Brown soils of the prairies. Farm journals, newspapers, and leaflets carried the messages to producers. Mimeographed circulars for grassroots consumption were sent out.

An oldtimer once heard me expressing my amazement at the amount of field work and numbers of plots, crops, buildings, plantings, and machinery testing done in that first decade. He answered, “It's surprising what can be done by a few people when they work 11 hours a day, 6 days a week.” And, I suppose, eating sandwiches from a Roger's syrup pail for lunch also increased the amount of time that could be devoted to each work day—no time was lost traveling home at noon hour.

Ready for the next step

By the end of the 20s the farm had already made a giant leap forward. It had developed an exceptional rapport with the farming community and had earned their respect. The farm staff at the time couldn't have realized the extent of their impact. In retrospect, though, the new farm couldn't have been spawned at a better time. Everything was booming in the 20s and the climatic conditions, as records show, were favorable for agriculture, with above-average precipitation. It's just as well the farm and its staff didn't know what fate lay ahead in the next decade.

CHAPTER 3

The second decade—the 30s

If, by and large, the 20s constituted the Go-Go decade, the 30s would turn out to be a mixed bag. Before the end of that decade the young experimental farm, along with the community, southern Saskatchewan, and indeed much of the southern prairies, was destined to live through a bumpy and trying route. First, the stock market crashed in 1929. The associated depression that followed became a morbid reality. Each succeeding year proved worse than the previous one. The whole region had to bear the added insult of successive or even simultaneous assaults from unparalleled drought, drifting soil, grasshoppers, crop failures, and the eventual start of World War II. No wonder the decade is still referred to as the Dirty Thirties in the southern prairies.

These problems put an added strain on the experimental farm. New and revised programs were needed to meet increasing new challenges to both immediate and long-term problems, with the former having priority.

A change of name

The Swift Current farm was, by 1937, being called the Swift Current Experimental Station. Some decades later it became the Swift Current Research Station. The official name remains irrelevant, however, since to most citizens of Swift Current and district the establishment is known simply as "the farm".

Additional staff were hired for expanding work in field trials, horticultural investigations, plant improvement, and soil-drifting control. Professional personnel were drafted to guide these programs, which, in turn, required further technical and labor support.

Soils Research Laboratory expands

The staff at the Soils Research Laboratory continued to grow. That separate laboratory was established in 1936. J.L. Doughty was named officer in charge. The soils lab was actually an offshoot of the National Science Service, not an integral part of the Experimental Farms Service of the Department of Agriculture. Today this matters little, but at that time each group wanted to protect its identity and the two entities did not cooperate much. Before the 30s ended the soils staff included physicists, chemists, and other soil scientists who were working on research studies covering soil erosion, aggregate stability, soil fertility, moisture conservation, and agronomic practices. On the soils staff were people like Bill Chepil, Joe Lehane, Reg Milne, Bill Staple, Frank Warder, Al Stalwick, and Fred Bisal. Extensive field shelterbelt plantations were established in selected areas throughout the Brown soil zone of southern Saskatchewan.

Agricultural engineering gains momentum

The Agricultural Engineering Section had its birth during this decade. Besides a drafting lab, there was work done on machinery modification, power measurements, and tractor wheel slippage. Members of that section brought in a pair of the first pneumatic rubber tires distributed for

above
Superintendent's house in 1935.

center **below**
Soil erosion. A challenge in the 30s.

tractors. The station conducted extensive tests with these new tires to determine their effect on anti-bounce weighting, slippage in different soil conditions, and fuel consumption. They chalked up 3000 hours of use on that one pair of tires and informed the public of their performance. These tires are now on display in the Western Development Museum at North Battleford.

As with much of the effort in other sections, the engineering group was extensively involved in providing immediate solutions and help to the farming public in its attempts to halt soil erosion, conserve water, and provide engineering skills to irrigation plans, water movement, ditch structures, and land leveling. Some of the people who developed the engineering program in this decade included Grant Denike, Stu Forsaith, and Jack Thompson.

Working with PFRA

The experimental farms in the southern prairie regions became the initial gateways for the early programs of the Prairie Farm Rehabilitation Administration (PFRA). The PFRA depended on the expertise of staff who should really have been doing research work. But the immediate need was great. Many of the professional and technical people, skilled equipment operators, and laborers became involved in overseeing, demonstrating, and actually leading the way in the vast job of arresting losses in, stabilizing, and restoring the soil and water resource. Irrigation projects were designed and built for the PFRA. Vast tracts of eroded land were regrassed, community pastures were developed, and range management studies and recommendations were formulated. It was difficult to know where the experimental farm ended and where the PFRA started or who was working for which. But the arrangement proved mutually beneficial. The farm may have provided the early know-how but it gained equipment and financial support in the long run from the PFRA.

Changing superintendents

Diversified demands for a kaleidoscope of disciplines, specialists, jobs, and priorities required an unusual degree of overall direction. The farm was fortunate to have obtained the right people at the right time. The visionary and restless L.B. Thomson became the Swift Current farm's second superintendent in 1935. All who worked for and with Thomson knew him to be a fair man but one who knew how to push, pull, cajole, and get the best out of his entire team. He recruited some of the best scientists he could find to do research for the farming public as well as to carry out the emergency service work that came up. His motto was: "You do the work—I'll find the money."

Demonstrating a better way

Providing advice to illustration stations and agricultural improvement associations became part of the farm's responsibilities. Through these avenues, strip farming and trash cover cultivation became generally accepted. Plots for demonstrating new crops and varieties were laid down. Improved cultural procedures were encouraged, and for some time, even seed was distributed from the farm. These illustration stations and experimental substations were located on private farms scattered throughout a region within a radius of about 150 km of Swift Current. These farms were chosen to represent a soil type or condition within an area. During the growing season each year the Swift Current station held 1-day district field days at some of these farm sites. The event almost resembled a mini circus. An advance truck was sent out with a large wall tent, poles, lashings, and pegs to erect the meeting hall. Planks and bench trusses went along to provide the seating. The next day speakers from the farm provided the entertainment by way of subject matter addresses. The Swift Current farm was very much involved with extending the research and recommendations of the day. At these events our station staff learned first-hand the problems and needs of the farming public it served, while the farmers were kept informed of the station's research programs. A solid image for mutual respect was thus created.

The conveyance of ideas for improved methods, new approaches, better equipment, and cultural practices from one region to another is often left to public agencies. The experimental stations were therefore expected to provide much of the leadership in this area. Although strip farming and trash cover cultivation essentially had its birth in southern Alberta, the Swift Current station played an important role in demonstrating and encouraging its adoption in southern Saskatchewan. These efforts might now be regarded as action programs, as indeed they were.

Controlling erosion

In a few areas farms were completely abandoned and erosion was causing distress to neighboring farms and nearby villages. Four of the worst-hit areas in southwestern Saskatchewan were at Mortlach, Meyronne, Vanguard, and Cadillac. These lands were rife with conditions of almost desert intensity. Their reclamation was assigned to the Swift Current station, and after three summers of work all areas were completely stabilized. Transformation was slow and often discouraging, particularly when 2 months of work could be lost by a 1-day windstorm. The usual reclamation procedure was to corrugate the land by listing in such a way that clods were brought to the surface. The area was then sown to fall or spring rye by the broadcast method. After a stubble was obtained, the land was sown to grass–legume mixtures. Many of the listing machines used were standard-manufactured equipment, but variations were also contrived by farm and village shops. Several experiments in tree planting were undertaken by the Indian Head Forest Nursery Station; two of these plantations are located along the Trans-Canada Highway near Mortlach, Sask.

above left **above right**
Trying to keep the soil at home.

center
Grassing abandoned farmland.

below
Soil tanks at the agricultural meteorology site.

Illustration stations become substations

The illustration stations were replaced by district experimental substations. On the illustration stations only a few hectares of the farmer's land were cropped according to directions from the Experimental Farms Service. But on the experimental substations the entire farm served as the basic experimental unit. With the exception of the substation at Valjean, all were at least one section in size. All were privately owned, but the general management, cropping practices, and livestock projects were operated under a cooperative agreement between the farmer and the Experimental Farms Service. Each farm operator received a small annual payment for his cooperation and for keeping a complete set of records. Ten new substations were started in southwestern Saskatchewan during the 30s. Four of the original illustration stations were expanded and added to the new program. The great advantage of this plan was the opportunity it provided for testing crops and cultural practices on a field scale, after they had been proven successful on experimental plots. Of equal importance, each substation became a center from which good farming practices radiated to adjacent farms.

Plant breeding begins

Through the 20s and much of the 30s the action in plant development was limited. Lots of crop introductions, variety testing, and comparisons and some preliminary selections were made, but not much progress was made in actual plant breeding. Plant breeding began to develop in the latter part of that decade. Plant scientists were being recruited. Notable were Arn Platt, S.E. Clarke, Lin Bolton, Scotty Campbell, and Baden Campbell. These people helped to swell the numbers of plant or crop professionals who had preceded them. Shorty Kemp, who had been jack-of-all-trades since the start, and Pete Janzen, another one of the early comers, now had, by their standards at least, an array of trained specialists at their elbows. Kemp had a keen eye and an imaginative mind; Janzen had the farming public in his hand.

Although not much happened in plant development, there was one occurrence that stood out in this decade. That was the licensing of the Swift Current station's first crop variety, Prospect barley, which was released in 1938. It was the first six-row smooth-bearded barley made available in this area. Many were to follow, but Prospect spawned the start of the smooth awn popularity. Prospect barley is a good example of the fruits of team work in any successful research project. Official credit and accolades for developing a new variety usually go to the scientist presiding at the time of its release. Unfortunately, such protocol fails to acknowledge key contributions made by other team members. Few people know that it was John Dore, cereal section crew leader of that day, who spotted the single plant of barley with the smooth awns that became the forerunner of Prospect barley.

People to do the job

Corny Smith, as farm crew leader, was an expert at handling men, solving problems, and manipulating the interaction between the policy makers at an institution and the people who implement the policies. Field crew leaders like Dave Morgan, himself a slave to work, got the best out of work crews, more by example than by pushing. He was stronger, faster, and more impatient than those who worked for him.

These dedicated early support-staff members were an inspiration to the growing numbers of professionals and technicians that joined the staff in the mid and late 30s.

The portfolios of people employed before the growth that occurred in the late 30s were often of a dual or even a multidisciplinary nature. Shorty Kemp, for example, was simultaneously assistant superintendent, horticulturist, cereal crops evaluator, inventor and builder of field plot equipment, and landscaper. Bob Blakely, who came as a junior horticulturist in 1932 and was later appointed to the permanent staff, evolved into another multitalented employee like Shorty Kemp. Besides eventually taking over all the horticultural work and greatly expanding the plantings of trees and shrubbery on the farm, he also became head of the poultry section. Imagine—here was a man who could successfully combine an interest in trees with an interest in birds.

Laboratory and greenhouse facilities outside of those used by the soils group were inadequate through the decade. Sophisticated crossing and hybridization of plant

above
Making hay in the late 30s.

below
Weather-beaten cowboys and a sheep herder in the Dirty Thirties.

material cannot be done in a hotbed. Consequently, improvisation became commonplace. If equipment and facilities could not be provided for the scientist, maybe the scientist could go to the facilities. This is precisely what Arn Platt did in the winter of 1937–1938 when he took the station's wheat selections to Ottawa for a winter's greenhouse and laboratory work. He brought it back in the spring for field growing.

The war years

Although research at the Swift Current station was officially discontinued during the years from 1935 to 1940, a strong research program did exist during that period. But in most instances, there wasn't time to have specific project outlines approved. The work urgently demanded giant strides. The Parliament of Canada wanted the agricultural economy in the Palliser Triangle revived. That was all the authorization necessary. It was a most exciting period. In spite of few formal experimental projects, the PFRA cultural program provided factual data that were interpreted in terms of research.

Getting to know the ranges

The native range and grassland studies introduced the ecotone concept of the vegetation–climate relationship within the Pallister Triangle. The natural cover was a mixture of plant invaders from northern and southern environments. The triangle was an area of convergence, where none of the dominant plant species were really at home and where weeds grew better than grasses. The vegetation responded quickly to the stresses of drought, to above-average summer rainfall or temperature, and to overgrazing. The need for exotic grasses and legumes to revegetate the eroded land was supported by this observation.

Irrigating on the level

When agricultural engineers on the irrigation projects at Val Marie and Eastend learned that the recommended standards for canals, head ditches, drainage facilities, head of water, and length of flow could not possibly be applied in that area of heavy clay soil where the slope was often no more than half a metre per kilometre, they had to make drastic changes. Water had to be moved across fields quickly. Therefore head ditches had to be twice as large as those that were normally satisfactory. With near-level land, the water flowed slowly and only for short distances. A complicated drainage system had to be developed to prevent ponding. Eventually field ditches were replaced by border dykes.

Solving cattle-feeding problems

The winter of 1937–1938 was disastrous for cattle ranchers who were trying to maintain their breeding herds. Insufficient forage was probably the main distress, but there were others. Excess selenium in the winter feed harvested around the Great Sand Hills and eastward as far as Mortlach became a new problem to be solved. Lin Bolton and Al Stalwick realized that a high selenium content in the soil was associated with the surface density of two legumes, narrow-leaved milk-vetch and two-grooved milk-vetch. In 1938, the range survey located ranches where cattle losses had been heavy the previous winter and symptoms indicated selenium poisoning. Cows that lived were barren, and they lost their hooves, tails, and hair. With the help of W.D. Davidson of the Dominion Veterinary Service, cows were slaughtered with ranchers' permission and postmortems were conducted. The postmortems supported the evidence that selenium was the cause of death.

Cattle losses did not end when the drought broke in 1938 or 1939. With the return of average rainfall, larkspur and arrow-grass grew profusely and cattle died when they grazed these plants. High nitrate levels in oat hay processed for winter feed often wiped out small herds in one night. A few years later, cattle deaths were also traced to the high nitrate content of water in some wells. The work of officers at this station uncovered the reasons for the livestock losses, but it was the veterinarian Dr. Davidson and Lin Bolton of the station staff who contributed the most to identifying the plant nitrate problem.

Increasing grazing capacity

Two PFRA community-pasture projects carried out at that time were a grass survey and a regrassing program. The grass survey measured the cover on each section of land within a pasture and estimated the land area that needed to be regrassed.

It was from this study that the point-quadrat-yield method to estimate the grazing capacity of grassland was devised. Reseeding the abandoned cultivated land to grass followed. But probably the most important result of these projects was the assessment of the regrassing work and of their grazing capacities under careful management.

Increasing poultry production

During the 30s the poultry people demonstrated how a flock of Barred Plymouth Rock chickens could be substantially upgraded through procurement of selected male breeding stock. Canada's average production per hen was only 90 eggs a year. By 1936 the experimental farm had upgraded its annual flock performance to 176 eggs a bird.

Taking turns sifting soil the old way.

One of the earlier dry mash feeds devised at the farm contained the following prescribed ingredients (the quantities by weight ratios are shown in parentheses): wheat (200), barley (200), oats (200), bran (100), shorts (100), meat scrap (100), charcoal (20), bonemeal (15), alfalfa meal (15), cod liver oil (10), and salt (5). A hundred birds reportedly ate 6 or 7 kg of this mash a day.

By the late 30s much attention was being given to studying adequate poultry housing. Studies included evaluations of size, insulation, ventilation, nest designs, types of feed hoppers, sanitation, and methods of disease control. The information gained was passed on to owners of farm flocks.

First scientific paper published

Through the 30s, there was an increase in the station's varied publications. Press articles were written, reports to provincial and national meetings were made, mimeographed guidelines were circulated, weekly letters were started, and departmental bulletins and scientific papers were published. The first scientific paper from this station, by S.E. Clarke, was published in 1927 in *Scientific Agriculture*. Another paper by Clarke appeared in 1930. Sydney Barnes was the author of an article entitled "Economic Aspects of Drought Resistance." Another scientific paper, written by Shorty Kemp, was published in September 1934. Its title was "Studies of Solid Stem Wheat Varieties in Relation to Wheat Stem Sawfly Control." All appeared in the same journal.

Library established

By the late 30s a library was started at the station with the appointment of Mabel Barnes as librarian. It occupied one room in the office building at that time. About this same time, Barbara Morice became head of the secretarial group. Her help in improving the general quality of the publications written at the station over the next 30 years was invaluable.

Dave Heinrichs, Walter Burns, and Roy McKenzie joined Baden Campbell and Pete Janzen in the late 30s to conduct and guide most of the reseeding restoration of wind-eroded soil.

Before leaving this chapter on the 30s, special mention must once again be made of the natural ability and tenaciousness of Shorty Kemp. His tinkering and inventive mind pioneered the strong reputation for developing plot equipment that the Swift Current station still enjoys today. Shorty built a cone plot seeder before he developed his famous V-belt seeder and plot thresher. The cone seeder has evolved to become the principal machine used for

plot work today. These small machines were provided to other experimental farms and stations even in the 20s and 30s, much as they are at present.

Some old-timers think that Shorty Kemp may have aspired to be the superintendent at one time. Maybe he got his fill of that dream when he was acting superintendent for 16 months in 1934–1935, between the tenures of J.G. Taggart and L.B. Thomson. Taggart had spent about 6 years trying to convince the Ottawa chiefs that more station land was desperately needed at the station. There is a file 5 cm thick on this correspondence. In 1934 Shorty Kemp summarized the 6 years' evidence in one letter he sent to the experimental farms director in Ottawa. It exceeded 2000 words. But he didn't get the additional land either.

Ingenuity helps

The 30s are far enough removed that I can now share some of the contrivances, shortcuts, under-the-table schemes, stunts, and improvisations engineered by certain administrative staff. I suppose all organizations, institutions, or agencies have to rely on leadership ingenuity to get around certain rules and regulations that don't fit a particular situation. The Swift Current station had its share of incidents that fell into this category.

Geographically, Swift Current is sometimes regarded as being an outpost, with no scheduled air service and few cultural amenities, offering little opportunity for advanced or postsecondary training. Once though, in the late 30s, the station conducted a residential agricultural short course for young farm lads. It operated for two winter seasons in town, located in what currently is the Thompson Automotive Supply building. Those who remember say enrollment numbered in the forties. Meals and sleeping accommodations were provided, and even a janitor–watchman. One wonders whether the head office in Ottawa ever knew of it. They would hardly have approved such a venture. There are advantages to being in the boondocks.

And then there was the case of the barn for nothing episode. Superintendent Thomson actually got the green light from his Ottawa chiefs to buy a sound, well-constructed barn from a farmer at a low price. Of course, it had to be moved. But moving a barn was beyond the practical capabilities of any local moving company. Under the artful eye of Nels Wallner, head carpenter of the station, and with Corny Smith's knack for dismantling and reassembling, the barn was moved to the station in parts. Somehow it wound up to be 3.5 m longer at its new farm site. The extra wood needed to increase the size of the barn was found somewhere. Although the discrepancy was eventually discovered by the director of the country's Experimental Farms Service in Ottawa, he decided to overlook the incident. He probably admired the ingenuity of the men who were able to get such a fine barn at a modest price.

CHAPTER 4

The war and postwar decade—the 40s

Wartime float assembled by the station for a parade in 1940.

Wars have a way of cutting into resources, be they people, money, equipment, or plans. A photo album on the station shows that during the war years from 1939 to 1944 no less than 88 of the staff had joined the forces. Seventeen of these became commissioned officers. That exodus was a real drain on brains and skilled staff at the station. Many of these people were the cream-of-the-crop who had been selected for professional or subprofessional positions to fill out planned and growing research programs. Some had been on the job for only a few years or even months. They were energetic, eager, and most importantly, young—ideal candidates for Canada's navy, army, and airforce. The military's gain was the station's loss, but nearly half of these people did return to the farm after the war. On their return some of those veterans took temporary leaves of absence to further their education under the Armed Forces Gratuities plan, which again proved quite disruptive to some research programs. Readers under 50 years of age will hardly know what postwar gratuities were. They provided a way for the Government of Canada to thank veterans for their wartime service. A discharged veteran could start farming under the *Veteran's Land Act*, receive assistance for home construction under a small landowners grant, or have his or her university training provided for. Many of us got our degrees or second degrees through this route. Mind you, university didn't cost $3000–5000 a year, the situation students face today. The gratuity plan paid the tuition fees and we got $65.00 a month besides while attending school. Some of us even saved money on a deal like that. With a summer job at $85.00 a month at the experimental station in 1947, students had it made.

Carrying on research under restrictions

But work didn't stop at the station upon the departure of more than half the staff. Some of those who left for war were replaced, other help was borrowed from elsewhere, and those staying behind worked harder. Priorities were established to identify what projects had to continue and what work could be discontinued. Hence, much of the extended PFRA work that had top priority in the previous decade was curtailed or terminated.

Consumer supplies readily available in peacetime were not abundant in wartime. Farm machinery and automotive factories were heavily involved in producing tanks, jeeps, carriers, field guns, and other sundry war equipment. Fuel was scarce. Rationing occurred. Consequently, the remnants of the Engineering Section studied ways to maintain farm machinery and to clean dirty oil for reuse. Several articles were written by staff members for the Wartime Production Series of governmental publications, covering topics of maintenance for specific farm machinery.

Meeting greater demands for wool

Wartime also dictated an increase in agricultural production. Although wheat was almost solely in demand in World War I prior to 1920, the need for animal products was equally as strong during World War II. The station became heavily involved in sheep production studies and worked closely with the growing sheep industry in the region. Wool was a hot item. Animal specialists like Jim Bennett and Superintendent Thomson built a respectable-sized breeding herd of Rambouillet sheep. Peder Myhr, later the information officer, started his station career as Bennett's assistant. These people, through selection and breeding, successfully reduced the extent of face cover and neck wrinkling of the Rambouillet breed. The flock outgrew pasture resources of the station. Like nomads of the past, Swift Current staff had to move their flocks and herds in search of pasture. Our modern nomads had, however, the benefit of a double-deck truck. On one occasion 300–400 sheep were trucked to wide-open shortgrass rangeland at the Matador ranch north of the Saskatchewan River. In another season the destination was the Rush Lake flats. Sheep were field-shorn by hired crews. Of course, a station camp was established on site. In the fall the sheep were returned to Swift Current headquarters for wintering.

Station personnel helped in the establishment of sheep production cooperatives among farmers and ranchers at Val Marie, Eastend, and Maple Creek. Quality, age, and soundness of sheep are mainly determined by the condition of their teeth for grazing. Jim Bennett, if you can imagine, examined the mouths of 10 000 sheep. Baden Campbell selected thousands of hectares of pasture land, and L.B. Thomson helped organize the local financing. Skilled earth-moving operators from the station built stock-watering dams and other facilities.

Much of the manpower, equipment, power units, and required supplies were procured through PFRA financing. Even the winter feed for the cooperative sheep bands came from local irrigation farmers who were members of the early PFRA irrigation projects. In what better way could farmers, ranchers, and communities of the region be served by an experimental station? Growth, stability, progress, and the eventual sophistication that we sometimes take for granted today all need time to evolve. Someone has to do the spade work and the dreaming in order to achieve gradual, but steady improvements. People during the 20s, 30s, and 40s were the ones laying the groundwork, assisted by guidance and recommendations from the station.

Horses in surplus

The Swift Current Research Station was not merely a sheep station. The station's work with sheep is just an illustration of the type of service rendered to society by experimental farms at that time. A similar example is found in the station's role in helping reduce the surplus of horses after the farm power and machinery revolution. Tractors were in and horses were out within a relatively short time in the 30s. Herds of wild horses were grazing the rangelands needed for beef and sheep production. With 1.5 million surplus horses on the prairies and war-stricken western Europe crying for meat, the station recognized the need for a processing plant. In 1944, it helped organize a horse meat cooperative in Swift Current. The new cooperative rebuilt the old abandoned power plant into a meat-processing plant and participated in the surplus horse disposal program for more than two decades to follow.

Many of the station's contributions to solving regional problems were made ironically at its own expense. Some personnel were lost to the institutions and organizations the station helped create.

Irrigation research expands

The station started irrigation studies in the 40s after the PFRA had built Duncairn Dam, the main irrigation canal, and the second storage dam at the Highfield Reservoir. The canal was built through station property. It made irrigation water readily available but added to the maze of right-of-ways that crisscrossed station property.

Trails, roads, and field locations were complicated by railway lines, No. 1 highway with an overpass, electrical power lines, and an irrigation canal with laterals, drainage ditches, and an underground waterline that ran to the British Commonwealth air training base 5 km east.

People who had been dispersed throughout the region to initiate, supervise, and manage PFRA projects were drawn back to station headquarters. Roy McKenzie came back from the Val Marie irrigation project to develop irrigation for

above
An improved strain of Rambouillet sheep developed in the 40s. A clean face and fewer neck wrinkles.

below
The station transported flocks of sheep to rangeland in the 1940s.

forage crops at the station in 1942 or 1943. The Cereal Section expanded their irrigation plot work about the same time. They had previously done some irrigating from the Swift Current Creek via an unreliable pumping system. This group, under Arn Platt's leadership in the early to mid 40s, grew substantially. John Dore was their able crew leader. The field crew, which included Steve Buzinski who had come to Swift Current in 1938 to play hockey, were by now serving a professional staff that included Charlie Jenkins, Stew Wells, George Darrock, Ruby Larson, and Alice Wall. Stu McBean rejoined this group after he returned from the war.

First irrigation methods. Water management mechanization in its simplest form.

Combatting the sawfly

In 1946 Canada's first sawfly-resistant wheat, Rescue, was released by the Swift Current station. This variety, like some crops to follow, fell short on quality. But being able to harvest a No. 3 wheat was undoubtedly better than having to watch a No. 1 wheat being devastated by insects. Furthermore, Rescue was to provide the germ plasm that founded improved varieties to come. In 1948 most of the Cereal Section was moved to Lethbridge, Alta., to join that station's group and they became an important part of the Prairie Region Project Group. McBean and Buzinski stayed in Swift Current to continue the wheat sawfly breeding and pursue fall rye breeding and regional cereal testing. Of all spring wheats being tested in the 1940s, the variety Thatcher was fast proving its superiority.

Alfalfa for the drylands

Creeping-rooted alfalfa, for which the Swift Current station, and Dave Heinrichs in particular, gained much national and international recognition years later, actually got its start in the early 40s. From Kemp's selected material of the 30s Lin Bolton chose to make crosses using Siberian alfalfas with varieties like Ladak. Bea Murray also contributed significantly to this early phase of the creeping-rooted alfalfa breeding program. This early work did not immediately result in licensed varieties. Plant breeding is slow, painstaking, and often frustrating. Like Martin Luther King, these early plant breeders had visionary faith but didn't realize what difficulties lay ahead.

Promoting cultural methods for drylands

Prairie farming habits and methods now taken for granted had their birth in the 40s. The soil lab's stored-soil-moisture phenomenon, and recommendation for weed control, strip farming benefits, and trash cover fallowing, were all brought together by the Field Husbandry Section of that time. People like Pete Janzen and Norm Korven conveyed these ideas to regional farms through experimental substations, field days, and producer meetings. Art Wendhart became an ardent student and promoter of these good cultural methods for dryland farming.

Sometimes even negative results can be beneficial. If something doesn't work successfully, the finding shows what routes should be avoided. For example, S.E. Clarke's corn program in the early 40s showed that corn could not become a viable crop on the dryland prairies at that time.

Crested wheatgrass for reseeding

Clarke's most significant contribution was his successful promotion of crested wheatgrass as the best grass for reseeding blown-out pasture land. With this crop he was able to achieve soil stabilization and reliable production. Thousands of kilograms of this grass seed were distributed to farmers and were used for community regrassing projects. Employees, now retired, remember the awesome labor of moving, bagging, and rebagging seed by hand into lots of 10, 25, or 100 lb (4.5, 11, and 45 kg) for distribution. Storage space was limited, so this grass seed was stored in the assembly hall. When the hall was needed for a meeting or social function, a small army of station employees moved the seed out. The next day they moved it back in. With no television in those days, people would do almost anything for a hoedown, concert, or card party.

Herbarium established

When the range experimental substation at Kamloops, B.C., was temporarily closed in 1941, its staff and all easily moved equipment were brought to Swift Current. Ed Tisdale, who was the officer in charge, some of his staff, and the Kamloop's herbarium wound up at the Swift Current station. Shortly thereafter, Archie Budd, the energetic self-taught botanist mentioned earlier in this account, became the herbarium curator. Students who worked for him sometimes remarked that Archie must have walked every inch of the prairies collecting plants and that he sure could cover the ground.

About this same time, Bernice Downing came to work at the farm in the accounting office. She became a legend. Quick with figures, with a memory like an elephant, the ship's purser, full of life, she knew the ropes and was impossible to cross. She assigned, juggled, held onto, or let go of the purse strings of the accounts for the station and the PFRA. She became known as "Ask Bernice" Downing. She had the answers.

Animal-finishing studies conducted

Briefly between 1941 and 1946, research on hog rations and steer finishing was conducted. These projects were initiated in wartime as stopgap measures imposed by federal policies through the then Agricultural Supplies Board. Conditions such as those in wartime dictate such an approach. Finding ways to increase production then becomes urgent. The projects on hog rations and steer growing and finishing were terminated just before the end of the war.

Turkey work started

Rearing and feeding work on turkeys began in 1946, replacing research with chickens. Bob Blakely headed this early research with turkeys. Bob brought in Howard MacGregor in 1949 who tested starter, growing, and finishing rations. The turkey nutrition research continued to expand and, unlike some other programs, it has flourished to this day.

Fertilizer trials started

Commercial fertilizers became more readily available in this decade. Although the selection was limited to only a few formulations like 11-48-0 or 16-20-0, little was known about their use in various soil types in the Brown soils. Frank Warder had started field trials before joining the air force. Upon his return he extended this work considerably. Soil types, cropping procedures, and fertilizer rates were monitored. Initially, farmers were often skeptical. I can vividly recall listening to one conversation between Frank Warder and a local grain farmer. Apparently, this farmer had finally decided to try fertilizer in one of his fields, if only to prove it was a waste of money. However, his results were startling. He couldn't wait to inform Warder of his discovery and advised him to try fertilizer for himself. This sort of public reaction is not uncommon even today.

Renewed vigor in research

Research activity in the postwar period was renewed with vigor. Farmer enquiries skyrocketed and pressure for answers gave an impetus to new studies and longer-range programs. The crash programs that had dealt with drought, soil drifting, and the war were suddenly behind us. The need for more in-depth studies using improved techniques to obtain more meaningful answers was recognized and new programs were put in place. It may seem commonplace now, but the coming of the semiautomatic and the so-called automatic desk calculators for data processing in the late 40s was in itself a real advance. These calculators sure beat the lever-pull adding machine and the slide rule.

There was a short recurrence of drought during the 3 years between 1947 and 1949. This time around the effect was not as devastating as before because of what had been learned about improved cropping practices more than a decade previously. At a research institution such recurrences are blessings in disguise. They are a reminder of the need for long-term studies, the necessity for caution, and the ever-present danger of drought. Plant breeders in particular can take advantage of an adverse condition to further their work. An adverse situation is predictably repeatable and is usually the mother of invention for an improved procedure, a new tool, a better variety, or a more reliable method.

Working with the PFRA on community pastures

After the war some of the cultural field work for PFRA interests were resumed. By this time there were several large PFRA community pastures operating in the southern prairie region. Although seeding and reseeding much of these pasture areas had been done in the previous 10 years there was still a need for management and grazing guidelines. Again, the Swift Current station conducted resurveys of these pastures, established carrying capacities, recommended cross-fencing patterns, and built enclosure sites within fields for measuring long-term grazing effects. Plots to study weed control, brush eradication, and cultivation and seeding procedures were laid out.

The Range Management Section at the Swift Current station then directed these studies within community pastures. A host of people were involved in this work over the years. They included during the late 40s and into the next decade such people as Ed Tisdale, Baden Campbell, Bill Hubbard, Al McLean, Bob Coupland, Bob Lodge, and myself.

Herbicide tests begin

Another postwar research project of significance involved some of the first testing of herbicides. Today we need a dictionary to list the available herbicides. In the mid 40s the choice was pretty well confined to 2,4-D. There were, however, even then some research personnel who were wary of advising the use of chemicals for pest control. This is not surprising. Society still has individuals who value biological control methods over chemical controls.

Understanding soil and water erosion

In the 40s, Bill Chepil initiated the study of soil physics, and later it was Fred Bisal who extended the program. This work provided classic basic knowledge to the understanding of soil and water erosion. Bisal constructed a wind tunnel in which predictions could be formulated concerning size of soil particles in relation to soil drifting and wind erosion. He also successfully contrived a rainfall simulator that led to his world-renowned studies on the soil-water splash phenomenon. Most of us didn't understand Bisal's calculations, theories, and mathematical models, but soil physicists around the world did. Many considered his work to be ahead of its time.

Establishing the principles

Some early principles in seeding forage crops for the dry prairie areas were being established in this decade. Alfalfa was shown to be the most dependable crop under irrigation, with yields, even then, being as high as 14 t/ha (5.5 tons/acre). Third cutting of alfalfa had not yet been established. The occurrence of winterkilling after third cutting discouraged that practice in the 40s. The cultural scientists of that time made good progress without the facilities that the research station enjoys today. Herbicides, fertilizers, seeding depth control, land preparation, pretreated seed, and other technology now readily available were not available 40 years ago or more.

The people of that era, however, managed to overcome problems and develop sound cultural cropping practices to accomplish nearly the same end results as are being obtained today. They had to be better craftspeople in the art of good farming. Thus the sound, solid principles that form the basis of today's techniques were developed. Technology today makes farming easier and faster but it was the old ways that showed technologists what to strive for. They pointed the way.

Refining range management

The experimental station in the 40s, along with the range station at Manyberries, Alta., and range management staff at Lethbridge, refined the early studies in range management. Classes of vegetation were identified, chemical components of forage plants were determined, livestock-carrying capacities were established, and grazing-management principles and recommendations were formulated.

Power requirements for equipment

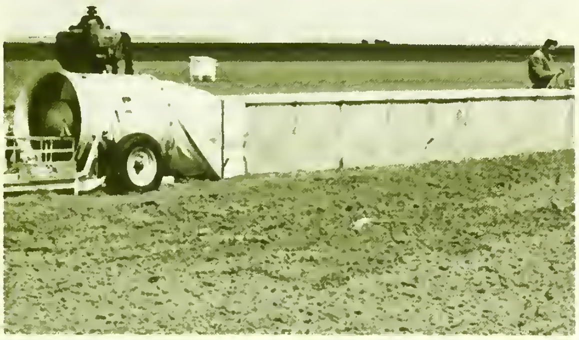
The Agricultural Engineering Section undertook extensive power studies on the requirements of an array of farm field equipment in the 40s. A vacuum-gauge horsepower recorder was designed and built. This instrument yielded considerable information on power requirements for draft and power take-off mechanisms for different machines operating at varying speeds and on varying field contours. Today's farmers and implement dealers converse knowledgeably regarding choices of power units and machinery. But where did all of today's sophistication get its start? Requirements had to be figured out, data compiled, balance formulas computed. The people at test stations, experimental stations, and universities contributed to accumulating a stockpile of knowledge. The Swift Current station played an important role. This station published some of the earliest guidelines for basic cost rates and custom work charges for farm machinery operations.

During this same period much engineering research went into design and maintenance of surface-water storage structures that were unique to prairie agriculture. Slope, runoff, dugouts, small farm dams, filters, seepage control, spillways, breakwater types, and other associated features were compared and tested, and recommendations were made. Staff added to the engineering group in the 40s included Murray Dodds, Glen Downing, Don Horne, and John Parker.

New leadership

L.B. Thomson's familiarity with the PFRA made him the undisputed first choice for that corporation's second director. In 1948 he moved to that post, vacating the superintendent's position at the Swift Current Experimental Station.

Grant Denike was immediately appointed as the station superintendent in 1948. After all, he'd been at the station for practically its entire history. It was not then fashionable to bring in new blood, a practice that now seems to be more popular. Denike, like anyone else, was sufficiently different to constitute a newness. He exemplified a good mix between innovation and an orderly approach to accountability. He successfully resisted off-station demands for his time and expertise. He preferred to keep in close touch with the people he was managing. He became the architect of the present layout of the station. Buildings, roads, terrain modifications, paving, machine shop expansion, and maintenance were Denike's legacy.

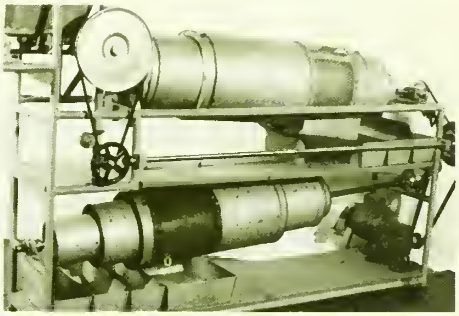


A force to be reckoned with

Near the end of the 40s the experimental station at Swift Current was a force to be reckoned with. There were nearly 30 professionals out of a total staff exceeding 100. There were seven general areas of research being conducted, namely, cereals, forage and range management, field husbandry and substations, agricultural engineering, animal husbandry, poultry, and soils. A total of 123 projects were in progress during the decade.

There were 13 substations: Bracken, Carmichael, Fox Valley, Gravelbourg, Kincaid, Limerick, Pambrun, Riverhurst, Shackleton, Shaunavon, Tompkins, Tugaske, and Valjean. Through these substations the experimental station sold and distributed top-quality seed to farmers in the larger southwest region. In this decade nearly 5500 t (200 000 bu) of grain and nearly 9000 kg (20 000 lb) of grass seed were sold for seeding use. This arrangement was responsible for the rapid distribution of new varieties at the time. Properly, agribusiness has since assumed this responsibility.

Aside from press releases, pamphlets, circulars, meetings, field days, and countless individual visits, contacts, and correspondence, the number of bulletins and scientific publications officially listed for the decade approached 20. These, plus the licensing of the first sawfly-resistant wheat, constituted the formal scientific achievement of the Swift Current station in the 1940s. Watch how these figures grew in the decades that followed.



above
A portable wind tunnel for studying soil erosion in the field.

below
The ultimate in soil sieving in the 40s.

CHAPTER 5

The station in its fourth decade—the 50s

The 50s saw the arrival of Keith Best, Ebbe Troelsen, Ken Clark, Tom Lawrence, Jan Looman, and Wally Pigden, who came to work in the area of plant sciences. In the area of agricultural engineering new arrivals in the late 40s and the 50s included Ralph Melvin, Floyd Bigsby, John Palmer, Bill Stammers, Peter Boving, and Kaljo Pohjakas. To do soil studies new arrivals during the same period were Bill Hinman, Leo Timushka, Ken Neilsen, Allen Kempton, Jim Beaton, Fred Cook, Dave Stevenson, Bill Pelton, and Don Read. For substation work came Dave Enns and Gordon Harris, and for poultry research, Jim Jowsey.

Thomson Hall, built in the early 1950s, contained living quarters, a dining hall, and a cafeteria. Later it was converted to offices and laboratories.

Total staff numbers remained stable through the 40s and the 50s. The number of projects and amount of work increased, however, despite the static staff number. By the 50s decade, however, increasing attention was given to outlines and definition of objectives and goals for research projects. Better planning guaranteed the continuation of and even an increase in programs, despite the departure of key staff members.

Shop facilities and power seeding established

There were some significant firsts in this decade. The large shop complex was completed and much of today's current shop equipment was put in place to service various areas of work: maintenance and repair, sheet metal, design and construction of equipment, machinery area, welding, electrical and precision tool room, and stores area. Other important structures built on the experimental station in this period included new facilities for rearing poultry, the Thomson Hall lodging and cafeteria, and the drafting laboratory. The first motorized power research plot seeder was designed and built in this decade. This four-row precision seeder replaced four people pushing single rod row belt seeders. If you've never pushed a three-steel-wheeled single-row seeder for even one day with the shoe opener 5 cm in the ground, you can regard yourself lucky. Those old single-row belt seeders either destroyed you or made a wrestler of you. By comparison, the four-row open-air power seeder of the 50s was a Rolls-Royce.

People who worked in the Cereal Section and also those in the Forage Section loved those little powered seeding marvels. After a day of seeding, the operators still retained enough strength to be civil. However, the machine had some shortcomings. It employed four open unsheltered rotating V-belts, which precluded daytime seeding in windy weather. This defect was circumvented by seeding before breakfast in the morning and after supper until sundown in the evening.

Housing the staff

Bunkhouse living accommodations for single men on staff or men working as summer students were consolidated with the construction of Thomson Hall, so named in memory of L.B. Thomson. Many of us have fond memories of that facility, which was recently demolished. For a few dollars a month, unmarried male employees were fed, sheltered, and bedded in that three-level edifice, in an old-hotel atmosphere. The building also served as a cafeteria for coffee breaks and many small supper meetings. Thomson Hall was eventually phased out as a residence and converted into offices and laboratory facilities. By the early 80s it had become an empty shell, used for dead storage until the building was finally demolished.

Another staff facility that was active through the 50s was the temporary accommodations for married couples then simply referred to as "the suites." By today's standards, the term "suites" was an exaggeration. They wouldn't even list as fair in today's travel guides. Renting at $30.00 a month, they served as a starting place for newlyweds or newly arrived couples on staff. Like Thomson Hall, the old suite building, a renovated old wartime airport H-hut, was phased out as living accommodations after a decade and converted into offices and a lab for a few years before being demolished.

Toward minimizing fallow

Usually in any situation where change is involved, we find it difficult to think beyond the present. In the agricultural community today, farmers are caught up in fairly high-tech considerations concerning mechanization, chemical weed control, fertilizer blends, and cropping procedures. Public consideration of long-term effects of technology on erosion and soil degradation, on increasing salinization of soils, of declining soil organic matter levels, and of the detrimental impact of continued extensive summerfallowing is still only limited. In the 1950s this experimental station, however, was already exploring the possibilities of using certain cropping procedures to minimize frequency of fallowing. On the basis of area cultivated (land in crop plus that in fallow in any given year), extending cropping beyond only the 1 year on fallow was shown to give higher overall yields. Even continuous cropping with cereal grains gave a 50% increase in total production. So today's concern for the soil's welfare began well before the past one or two decades. Unfortunately, experimental work is often far ahead of accepted practices of the day. The predictions of Don Rennie of the University of Saskatchewan about the eventual cost of flagrant misuse of the land are going to come to pass whether we like it or not. This experimental station, although less vocally, was predicting these very problems in the 50s.

Value of starting early

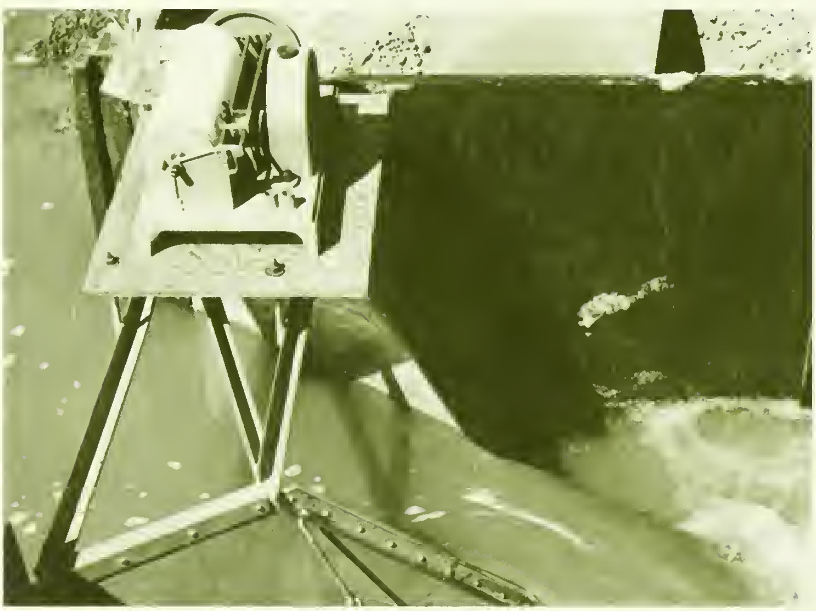
During this decade the Swift Current station showed the importance of starting field cultivation early if a producer plans to fallow land for a season. When summerfallowing for weed control was started in May the grain yield in the following crop year was maximized. The grain yield was at least 10% less if fallowing was delayed until 1 June, 12–15% less if delayed until mid June, and approached 20% if delayed until 1 July. The significance of the date on which cultivation was begun had not previously been measured numerically. Such measurements in themselves may not have constituted a major breakthrough, but they did add factual evidence to prior observations by researchers and farmers. Providing sound evidence and predictability factors for a wide range of cropping systems allows producers to plot a better strategy for making decisions on management. Producers build their management models from bits and pieces of information. One small experiment may not seem

The shop gang in the winter of 1950–1951.

important at the time, but when the results are added to earlier information, the experiment may contribute significantly to the overall benefit to farmers.

Looking to the future

During the 50s, research endeavors were indeed taking on a futuristic thrust. Not only would these objectives better serve the farmer in the future, they would also provide guidelines to the expanding agribusiness industry, which serves producers. Soil moisture and nutrient status and changes were monitored, nutrient deficiencies were identified, and predictions of fertilizer requirements under specific cropping situations were made. In turn, fertilizer companies adjusted and geared themselves for inevitable new demands for better products. The good-quality products available today are the result of research conducted 30 years ago or more.



Measuring the runoff from melting snow.

Some research pursuits do not seem relevant at a particular time or place, but the results gain significance in the next decade or demonstrate their practicality at another location. Swift Current research people were once involved, for example, in designing and refining a flax brake. Flax-straw processing will probably never be an industry in the dry southern prairie region around Swift Current. But the studies were undertaken here because the station had the expertise and because the device would be of use to private industry and to flax producers in other areas of the country.

Agricultural engineering and hydrology important concerns

The Swift Current station had become the designated agricultural engineering center for the experimental farm system in western Canada. Hydrology and water studies were extensive through this decade. A host of measurements concerning slope, soil type, runoff, erosion, seepage, gully stabilization, canal lining, irrigation methods, and evaporation suppressants for dugouts were determined or finalized. This work was the basis for recommendations made to producers, government agencies at all levels, and the agricultural machinery industry on practically any problem related to the conservation, control, and management of water. These types of studies did not end in the 50s but they represented a major contribution to the station's research during that decade.

Reorganizing cereals work

Early in the decade cereal work was reorganized to fit the small number of staff remaining after the majority had been moved to the Lethbridge Research Station in 1948. Stu McBean and technician–crew leader Steve Buzinski expanded the fall rye improvement program, which would later result in the development of new varieties. They also continued work on the development of sawfly-resistant spring wheat. The sawfly work culminated in the licensing of the variety Chinook in 1952. This variety had acceptable hard red spring wheat quality and replaced the first sawfly-resistant variety, Rescue. The Cereal Section continued to test promising breeder material sent to the station from other research locations in western Canada, in order to determine the suitability of these cereal grains under regional conditions.

Forages to meet the needs

In forage research during this period interest in Russian wild ryegrass began to expand. Plans were developed and breeding work was implemented to overcome the problem of low seed production with this grass. It was then being recommended primarily for fall pasture because of its ability to retain a comparatively high protein content late in the season.

Swift Current was recognized continentally and, indeed, in other parts of the world when the improved hardy creeping-rooted alfalfa variety Rambler was licensed in 1955. Dave Heinrichs reaped the accolades, but earlier work by people like Shorty Kemp and Lin Bolton was vital to this success.

Innovative ideas in forage management

Sometimes the station tested ideas of innovative farmers. A farmer from Maple Creek, Sask., for example, once claimed there were hay-yield advantages to be gained by growing grass and alfalfa in alternating rows of pure stands rather than as a mixture of the two in every row. Testing of the alternate-row theory was expanded in the 50s. Initial results were dramatic, especially in years of below-average precipitation, when these stands produced yields twice those obtained from mixed stands. These findings led to expanding studies of this technique, which continued for the next two decades.

Studies on cross seeding of cereal companion crops, as well as on benefits from ever-increasing inter-row spacings, were first started in this decade. The first serious research on pasture systems at the station was started in this decade, exploring the complementary uses of seeded pastures with native grass pastures. Previous observations were confirmed, regarding the need for delayed spring grazing of native grasses. This time, however, actual measurements provided concrete evidence. When grazing began in May, total seasonal production was reduced by 30%. The importance of using seeded pasture with tame grasses during early spring, so that use of native grassland could be delayed, was being increasingly advocated. This principle seems to have been a hard one to sell. Now, decades later, there is still widespread evidence that abuses are as rampant as ever. This lack of reaction to research evidence by some producers is a continuing frustration to scientists.

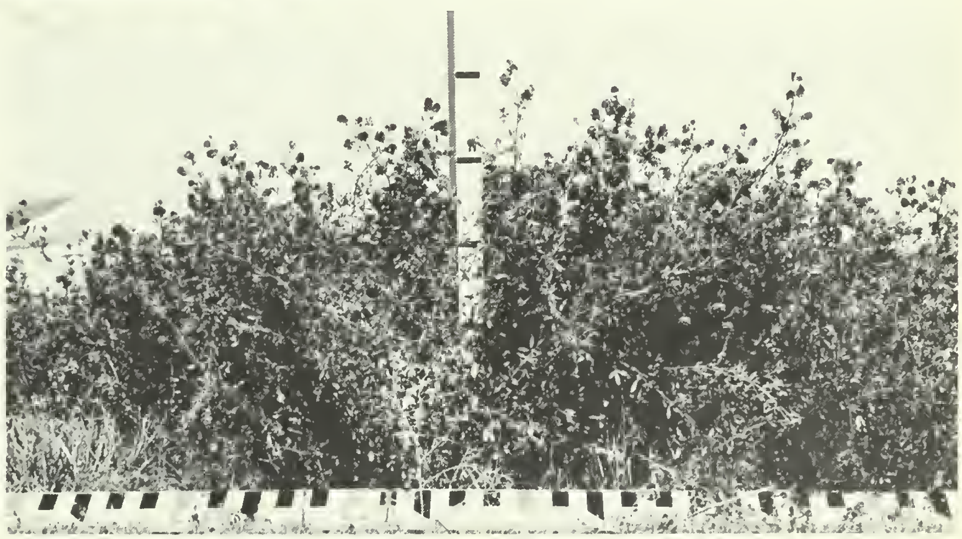
Poultry expands

Poultry research was expanded considerably. Swift Current became the designated western Canadian poultry nutrition center in the experimental farm system. The feed trade was not providing starter or growing diets that were of adequate quality to meet the requirements for rapid and efficient growth of birds. Work at Swift Current contributed to identifying the importance of using antibiotics, growth stimulants, minerals, vitamins, and pelleting procedures in

above
The root system from one plant of Russian wild ryegrass (numbers indicate feet).

center
Creeping-rooted Rambler alfalfa in 1955.

below
A flock of turkeys on the station in mid 50s.



preparing efficient diets. Poultry nutrition has advanced considerably since the 50s, but intense research in the area got its start in that decade. The benefits now enjoyed by the poultry industry nationwide is another example of how effective research done in the regions can be.

Soils Research Laboratory joins the farm

The Soils Research Laboratory had been essentially an independent unit under the Federal National Science Service for almost three decades. In the mid 50s it officially became part of the Experimental Farms Service, known as the Soils Section of the Swift Current Research Station. In addition, the former Field Husbandry Section was disbanded and its personnel were absorbed into the new Soils Section. Immediately, this group became the largest section of the experimental station. Areas of research included soil physics, soil chemistry, cropping procedures, crop rotations, fertilizer studies, and agrometeorology.

Climatology records had been collected for decades. Bill Pelton, who was later to become a director of the Swift Current station, was recruited in the late 50s as the station's first agrometeorologist. A pile of climatic data and records was waiting for him. His studies opened new doors of understanding for other scientists studying the crop–soil–climate relationship.

Horticultural crops tested

Throughout this decade horticultural work at the experimental farm continued to consist of evaluating new fruits, vegetables, and ornamentals that had originated from breeding programs at other experimental institutions or universities. This station had never been designated as a site for the development and breeding of horticultural plants. However, a tomato-breeding project that began in the previous decade culminated in the licensing of the variety Swift. It was a round, medium-sized fruit with smooth skin and intense red interior. This variety is still widely used in the prairie region. Bob Blakely was ultimately responsible for this achievement, but a former gardener, Archie Wells, Sr., did most of the early selection work.

Administration consolidated and the computer arrives

Although the volume of paper involved in administration was less than it is today, it became sufficiently large and detailed in the 50s to warrant the employment of a full-time administration officer. Gil Kerley was brought in as the first administration person to be given the responsibility for consolidating the various facets of administration at the station.

Also, by the late 50s, the compilation of increasing volumes of data had become so overwhelming that the station decided to try putting it on computer. Harold Moen was the first computer specialist. He revised existing computer programs and wrote new ones. Scientists at the station were impressed with the increase in efficiency, even if stacks of teletyped tape had to be mailed to a computer in Ottawa for processing. Then, even better turn-around time was attained when Harold himself transported tape to a computer at the Suffield Military Base in Alberta for processing. He used the computer at Suffield during the night while their staff slept. Harold put in a lot of miles on the road in those days.

Television broadcasts initiated

Another activity started in 1958 that continues to this day was the staging of a weekly live television program reporting developments in agriculture. Sponsored jointly by the research station, the Swift Current Agricultural and Exhibition Association, and the local television station, the program was hosted alternately by research station personnel or the local provincial agricultural representative. Baden Campbell hosted the show for a short while, followed by Peder Myhr for at least 25 years, and I was involved myself for 20 years. The program has been called "Farming Today" from its inception.

A weekly television program on farming news has lasted for 25 years.

International involvement blossoms

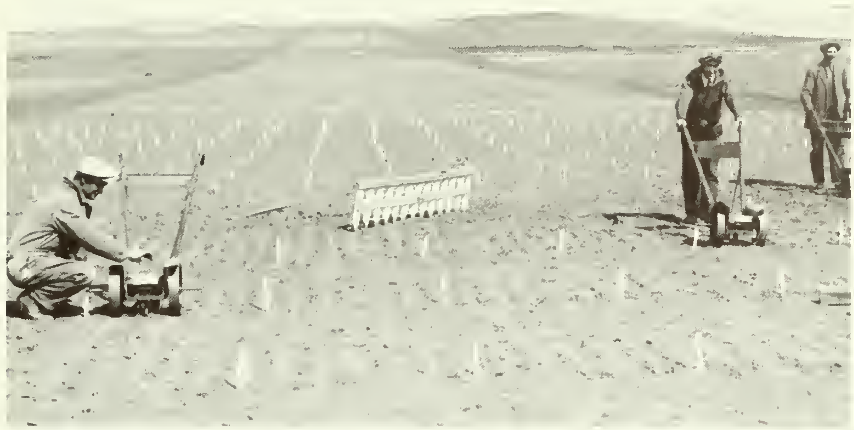
By now the Swift Current station was earning recognition on a global scale. Delegations began to come to us for new information from Russia, the United States, and other parts of the world in those years. This research station became known as an important dryland agricultural research institution. Some of our scientists began to travel to foreign lands to share their expertise. Bill Chepil left the station in 1949 to spend 2 years in China advising on soil erosion problems. Baden Campbell spent a season or two in Iceland advising on range management programs and later had a stint with the International Joint Commission, studying and recommending on the concerns of international water flows between Canada and the United States.

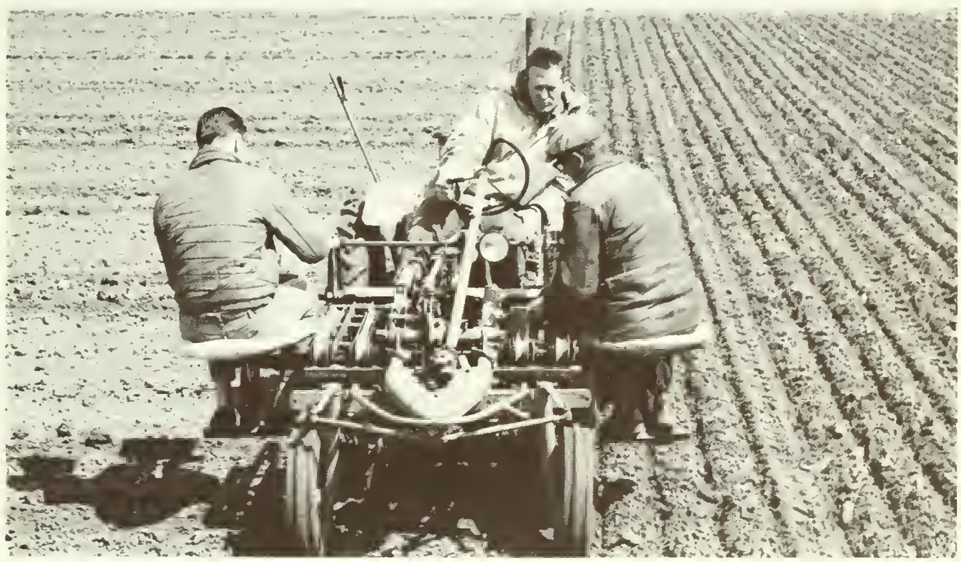
No one could foresee the tremendous mushrooming of interactions with other countries following these first few international exchanges. The world was shrinking, our obligations to humanity were growing, and our concerns could no longer be confined to the Swift Current area, the prairie region, or even to western Canada. We were to be caught up in world dimensions.

Reaching scientific maturity

By the end of this decade the institution was showing signs of maturing. Time was no longer being devoted to those earlier trial-and-error pursuits. The basic principles had been sufficiently established. We had set the broad parameters and understood the limitations dictated by the climate and forces of nature. New priorities were now being established.

Another notable trend was the substantial increase in the number of scientific publications being released. The number had increased during this decade from about 20 in the 1930s to 61 in the 1950s. About three times that number of publications classified as miscellaneous were also released during the decade. These comprised bulletins, leaflets, press articles, and symposium proceedings. Over and above these were numerous press and radio interviews and the publication of a weekly letter widely distributed to newspapers.





How plots were seeded in 1920, 1950, and 1980.

CHAPTER 6

The fifth decade at Swift Current—the 60s

Another change in leadership

After being superintendent of the Swift Current Experimental Farm from 1954 to 1965 Grant Denike moved on to Ottawa. J.E. (Ed) Andrews became station director, coming from Brandon where he had held the same position. Andrews remained at Swift Current until 1969 when A.A. (Art) Guitard replaced him. He transferred from Beaverlodge, Alta., where he also had been director. Thus, the farm had used the services of five bosses during its first 50 years, namely, Taggart, Thomson, Denike, Andrews, and Guitard.

Albeit brief, the following comments could partly describe these chiefs. Taggart was a statesman-like person with a vision. Thomson was a fierce defender of his staff and a man of action. Denike was a builder, with a knack for managing bureaucracy. Andrews wanted everything on paper and generated more memos than the others put together. Guitard tended to be autocratic but fair, and he looked for reaction.

Continuing staff changes

The fifth decade saw a greater change in professional staff than that which occurred in previous decades. In all, 22 people made major moves. Four left to join staff at the University of Saskatchewan, three retired, two joined agribusiness, three went to other government agencies, two left on foreign assignments, and two transferred to other stations in the Research Branch. These departures were partly offset by nine appointments. Of these nine, three were transfers from other establishments within the branch, one came from agribusiness, one came from a university, and four were new postgraduates. The experienced people who were taken on staff had proven records and found the change stimulating, while the young professionals were products of the latest scholastic training and provided new blood.

A new research building

The physical changes during this decade were about as spectacular as the personnel changes. Years of planning, submissions, requests, cajoling, begging, proposing, and sheer persistence finally resulted in the completion of the new research building in 1965. Most institutions, be they federal, provincial, municipal, or university, sustain a growing-up period. Prior to the mid 60s the Swift Current establishment constituted a collection of frame buildings each housing offices, laboratories, and some specialized work areas. These were supplemented by field work and storage buildings.

The new research building was constructed of steel and reinforced concrete resting on pedestal concrete piles. The office wing contained individual offices for each of the scientists; a library; sections for administration, clerical, and accounting functions; a cafeteria; and a computer room. The central block provided laboratories, an animal surgery, a photography section, a heating plant, washrooms, rotundas, an elevator and staircases, and electrical panels and other services. The other wing of the new building contained growth rooms with controlled environment and a large header house to serve four attached greenhouses.

This research building brought together the research personnel and technical support staff from all sections, an arrangement that led to better interdisciplinary communication and more effective experimentation. Brain-storming new ideas was made easier.

Saving the moisture

The Soils Section received a large portion of the newly recruited professional staff in this decade. Hank Anderson transferred from the Beaverlodge Research Station in Alberta to conduct soil management and field tillage research. Wilf Ferguson came from the Brandon Experimental Farm to head the section and do plant nutrition research. He replaced Ken Nielsen who had previously transferred to Ottawa. Con Campbell joined Frank Warder in soil chemistry research. Dave Green came as a plant physiologist. Bix Biederbeck filled the soil microbiology position. Doug Stewart came as the agrometeorologist, replacing Bill Pelton who had taken an assignment with the Canadian International Development Agency (CIDA) in India.

Information provided by the soils group in this decade included conclusions drawn from long-term data that showed that over several years standing stubble conserved an average of at least 30% of snowfall precipitation. By contrast, during these same years summerfallow fields conserved less than 10% of the snow for moisture infiltration into the soil.

Herbicides, fertility, and cultivation

During this decade the first studies were done to determine the feasibility of applying herbicides in the fall to control winter annual weeds such as stinkweed and flixweed. The herbicide 2,4-D at only 425 mL/ha controlled these weeds so successfully that summerfallowing the following year could be delayed by a month, thus eliminating one field operation. All fall sprayings were equally effective through October, November, December, or even later, as long as there was an absence of snow cover. Keeping the nozzles from freezing was the only problem with late fall spraying, but this problem was solved by using hot water.

Cultivators with blade-type equipment continued to show their superiority over those with disc-type equipment. They left desirable trash cover that controlled soil erosion more adequately.

Fertilizer trials in farmers' fields throughout the region came into vogue in the 60s. People like Warder and Read were heavily involved with these trials on all soil types throughout the Brown soils of southwestern Saskatchewan. The data collected were used by the Provincial Soils Advisory Committee to provide benchmarks for recommendations by the University Soil Testing Laboratory Service. In the early 60s nitrogen deficiency in soil had not yet reached the proportions that we know today. Shortly thereafter this ongoing program of soil monitoring and fertilizer testing provided evidence of the decline in soil fertility that is now receiving considerable publicity. Back in the 1950s Doughty, Warder, and Cook had demonstrated that where virgin land was broken and cultivated, more mineral N was produced than cereals could use, and in a wheat–fallow cropping system large quantities of nitrates leached down into the subsoil.

Improving research techniques in soils

Whereas soil tanks and daily weighings were used throughout the 30s and 40s to obtain a measure of the relationship between growing crops and soil moisture, a newer procedure using lysimeters was introduced in the 60s. A network of field lysimeters covering over 2 ha was installed. Free-standing tanks of soil were buried in the field to ground level. These soil tanks rested on pneumatic pads. Each tank was wired to a central recording collection center. Reams of tape continuously punched out figures showing weights and water use patterns, along with such climatic parameters as temperature, humidity, amount of sunshine and cloud cover, rate of evaporation, and wind speed. The new challenge to technicians was to keep the complex equipment operative.

Fred Bisal designed and built one of the first power-driven single-screen rotary sieves for studying the physical properties of dry soil. This machine greatly enhanced soil separation into declining aggregate size. It was less destructive on soil samples and provided more realistic component values than did the old handshaken sieve boxes. These separations, in reconstituted proportions, were used in controlled wind tunnels to obtain soil erosion values for soil drifting predictions. Consequently, Swift Current became renowned in the field of soil physics in Canada and North America. Names like Staple, Lehane, and Bisal were internationally acknowledged and the findings of these people were taught in most universities.

Pioneer testing shows the results from spraying chemical herbicides on stubble land in the previous fall (*right*).

Perennial grass and legume seeded in different patterns in the 60s.

Winter wheat and minimum tillage studies started

Field trials with winter wheat and the first serious experiments with minimum tillage were started in this decade. Research work in microbiology at Swift Current was expanded notably from its beginnings in the 50s. Perna Chandra and Ted Cook had shown earlier that certain herbicides, if not used with discretion, might affect soil nitrification.

Long-term rotation studies

When an experiment is first devised, designed, and implemented, the results are frequently not predictable. Therefore their practicability and impact cannot be foreseen. The importance of the research might only be realized years later. In the mid 60s Wilf Ferguson and Hank Anderson started what has now become known as the Swift Current long-term rotation study. Its objective was to assess the economic viability of using various crop rotations in southern Saskatchewan. For example, the feasibility of growing wheat continuously, or in 2- or 3-year rotations with fallow substitute crops such as oats, flax, and fall rye, was studied. The role of fertilizers was also assessed. Measurements were made for yield, protein quality, and the physical, chemical, and biological properties of the soil. Economic analyses were to come later.

Cereal breeding shows results

In 1962 a new variety of sawfly-resistant hard red spring wheat, Cypress, was licensed. This important new variety would replace the variety Chinook, which had come out in 1952. Chinook had replaced Rescue, which had been released in 1946. This progression typifies plant breeding work and illustrates the amount of time needed to make improvements. Between 1946, 1952, and 1962 hundreds of selections, crosses, repeats, growing-out periods, and measurements of yield and quality were made. Urbanites often ask station staff, "What do you people do out there?" How do you explain research in a few words?

Fall rye breeding culminated in the release of a variety called Frontier in 1964. Frontier was the first Canadian variety of fall rye to originate from an ongoing hybridization program. It represented an improvement in kernel size, seed color uniformity, and yield over older varieties.

The Swift Current Research Station also made important contributions to two barley varieties in this decade. Palliser barley in 1960 and Galt in 1966 had been extensively studied at Swift Current before they were tested in regional Cooperative tests. Some of the attributes of the early-generation material included in the two varieties were identified by Swift Current cereal breeders.

Fred Townley-Smith joined the cereal research group in the late 60s. Ross Ashford and Jim McElgunn were professionals recruited as forage crop scientists during this decade.

Expansion of ecotype studies

Jan Looman, a plant ecologist, became the herbarium custodian. He expanded the ecotype surveys in western Canada and continued specimen collections of plants, many of which were previously not known to exist in this part of the world. In ecological studies of plant communities, associations, and groups a new classification system was devised and proposed for general use. This system facilitated global comparison of native plant flora.

Assessment of forage quality

Ebbe Troelsen developed an in vitro digestibility procedure using the artificial rumen technique for laboratory evaluation of forage feeding quality. A closely related procedure called the sensory evaluation of the feeding quality of hay was also refined. It proved to be a more reliable prediction system for feeding quality than that contained in the Canadian *Hay and Straw Inspection Act*.

Forage breeding shows results

The first improved variety of Russian wild ryegrass developed in Canada was Sawki, licensed in 1963. Developed by Tom Lawrence, it yielded 12% more than commercial types of the same grass. During this decade, management studies of this grass revealed that a seed yield advantage could be gained by intensely grazing the seed fields after seed harvesting.

Pasture studies that were under way using Russian wild ryegrass demonstrated the advantages of widely spaced rows. Rows spaced 40 cm apart extended the time available for fall grazing by 35% compared with that achieved with 20-cm-spaced rows. When rows were spaced at 60 cm the grazing period was extended by a further 25%.

The continuing work in alfalfa breeding added another creeping-rooted variety to the recommended list in western Canada. This time it was Roamer alfalfa, released in 1966. It displayed a combination of desirable characteristics present in the varieties Rambler and Beaver already available. However, it also displayed a resistance to wilt disease, which Rambler did not possess.

In an endeavor to determine if alfalfa varieties contributed in different degrees to bloat in cattle, pure stands were grazed for a few years. Four varieties of alfalfa, representing a range of plant types from taprooted to strongly creeping, were grazed by various groups of cattle from yearling steers to mature cows. Not one of the animals bloated. However, we could not conclude that alfalfa does not contribute to bloat, because some farmers had indeed experienced losses of cattle after grazing alfalfa. Perhaps we could only conclude that there was no bloat hazard at the Swift Current Research Station.

Tall wheatgrass, renowned for its tolerance to salinity, had previously been subject to winter injury. In 1966 a winter-hardy variety was licensed. It was named Orbit and is to this day the most popular variety.

Leafcutter bees prove useful

Use of leafcutter bees to improve alfalfa seed production was first employed at the station in this decade. The Lethbridge Research Station was doing most of the research on leafcutter bees at the time. However, we were able to show regional seed growers how to manage this domesticated insect.

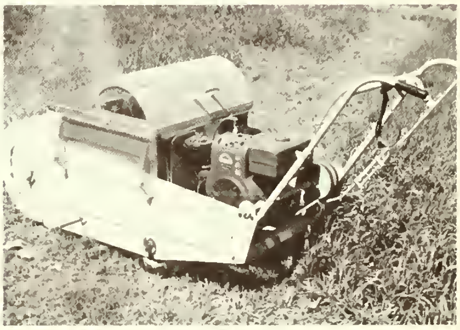
Irrigated pastures

The superiority of Troy Kentucky bluegrass for irrigated pastures in western Canada was first demonstrated at the Swift Current Research Station. Its prolonged growing habit throughout the grazing season was its strong point. As a constituent in a grass and alfalfa mixture its season of use for grazing did not drop off abruptly, as occurred with bromegrass and intermediate wheatgrass.

Engineers study swathing and design plot equipment

It was in this decade that the Engineering Section obtained new professional staff in the persons of Wally Nicholaichuk and Ben Dyck.

Murray Dodds had become almost entirely involved in the study of different types of swathers for harvesting grain. He helped determine the merits and weaknesses of various windrow patterns. Then came studies into the effects of time of swathing and kernel moisture content on the resulting quality of the grain. This work continued for some years and showed how wheat could be cut at 35% kernel moisture without adverse effects on quality of grain. Shattering was minimized and the last-min-



above **center**
Artificial rumen studies in the biochemistry laboratory.

below
A flail forage plot harvester designed and built at Swift Current in the 60s.

Lining irrigation canal to control seepage.

ute harvesting panic could be somewhat alleviated by starting to swath sooner than was done traditionally.

Design and development of plot equipment continued. Ben Dyck, a design engineer, was by now augmenting the work of Jack Thompson. Ways to improve plot machinery for seeding and harvesting were being pursued with vigor. Various prototype machines that defied description were built and tested. A number of these small machines were discarded or so completely rebuilt that they bore no resemblance to their ancestors. Cone seeders of the Shorty Kemp era, while not resurrected as such, were refined and became quickly accepted by research stations and other institutions across the continent. Likewise, harvesting equipment for both forages and cereals was continuously being designed, built, tested, and modified. This research attracted a good deal of national, continental, and international attention. Some of our engineers traveled throughout foreign countries exchanging knowledge about plot equipment.

Irrigation studies expand

Irrigation studies expanded in this decade. Industry found itself relying on research institutions to do the testing, make the comparisons, measure the performance, compile data, and point the way. Hans Korven spent most of his career on irrigation studies, which included studies on water distribution, rates of application, efficiency, types of irrigation, percolation rates, cost comparisons, and canal and ditch maintenance. These scientists use a jargon of their own. They talk about heads of water, c.f.s., lift, power requirements, borders, dykes, dams, spread, canals, ditches, syphons, turnouts, sprinklers, guns, overheads, flow and pressure regulators, trickle irrigation, laterals, evaporation, seepage, advection, uniformity, and peak requirements. However, it eventually all came out in the wash. They admirably served the needs of producers and the irrigation industry as a whole.

These studies established the amount of water consumed by different crops in southern Saskatchewan. Specifically, when soil moisture is maintained at a readily available level, crops were shown to use the following number of centimetres of water: perennial grass–alfalfa mixture, 58–68; sugar beets, 61; potatoes, 56; barley or wheat, 48–53.

Controlling seepage losses

Work on seepage from dugouts, farm dams, and irrigation canals increased through the 60s. Various materials were compared, including black sheet plastic, asphalt, concrete, and compacted clay. Plastic proved to be the best material for reducing seepage. Irrigation canals tend to promote excessive vegetative growth, which impedes water flow. In the 1960s much attention was given to this problem and some progress was made, but these results were not entirely satisfactory, as continuing studies today attest. Soil sterilants were studied for their effectiveness in controlling growth and for their safety and stability, to ensure that they would not be transported onto fields by irrigation water.

More gadgetry

Engineers like Bigsby and Dyck were versatile at machinery gadgetry. During this decade, some of their earliest work on automatic depth control for discer-type equipment was carried out. Devices were built, tested, and modified. A soil penetrometer, which was used to measure soil density, was modified to measure turf sponginess. Another device was made that automatically added predetermined amounts of water to individually potted plants in the greenhouse as required.

Better and cheaper poultry diets

In poultry nutrition, studies using rapeseed products were expanded. In diets for breeding turkeys, rapeseed meal was shown to be as good as or better than soybean meal as a high protein source. This conclusion came after comparing egg production, egg size, feed consumption, body weight, and fertility of hatching eggs. Rapeseed oil was found to adversely affect growth in young poults, while older poults were less affected.

Fowl are less choosey about the quality of the grain they eat than are ruminant livestock. Swift Current scientists, however, wanted to determine how damaged grain in the diet would affect the performance of birds. Grains damaged by smoke, fire, and mold were used as ingredients in turkey diets and all diets proved acceptable for growing birds.

In their early work, Ray Salmon and Ken Dunkelgod, both young scientists, determined optimum amino acid balances for poult diets. Salmon determined the effects on poultry of the type of fat added to the diet. Rapeseed oil produced a soft, unsaturated carcass fat, whereas tallow led to much harder, saturated fat in the birds. They also began working on adjustment of the density levels of nutrients in the diets, to meet anticipated demands by the turkey industry for higher feed intake and a faster growth rate.

First information officer

Peder Myhr, who had worked mainly with sheep in the late 40s and through the 50s, assumed the position of liaison officer for animal and forage crop production early in the 60s. He was the counterpart of Pete Janzen, who was the liaison officer for crop production and project farms. Janzen retired in 1970, at which time Myhr became the sole information officer. He had the distinction of being the first person to occupy that classification at a station outside of Ottawa.

Horticultural contributions

Research work in horticulture at this station has always been limited. Swift Current, designated primarily as a dryland research station, did not have a need to serve a fruit or vegetable industry. Aside from interest in home ornamentals and domestic gardens, there was no commercial horticultural industry in the area. The horticultural industry that was thriving in other more suitable climatic regions in western Canada was being adequately served by universities, the research station in Morden, Man., and provincial institutes such as the Horticultural Research Centre at Brooks in Alberta. Be that as it may, the Swift Current horticulture group under Carl Carlberg's direction did do an admirable job throughout this decade. They conducted cooperative trials for other research units and evaluated fruits, vegetables, and ornamentals for the immediate area. Each year a recommended variety list was made available for use in the home garden. New varieties were continuously being added and older ones replaced during the 1960s. Thus nine new woody ornamentals, nine herbaceous perennials, four vegetables, and four fruits were identified as being suitable for the area.

Increasing international interaction

Reflection on the history and role of the Swift Current Research Station in the 60s shows that its image and importance had clearly gained world recognition. The number and frequency of foreign delegations received at the station increased markedly, as did the number of staff scientists who went abroad to help in third-world countries. Although these activities sometimes disrupted ongoing programs, people helping people is really what life is all about. The station hosted delegations, groups, and individuals from Russia, Australia, New Zealand, South America, Britain, the Netherlands, Scandinavia, and the United States. In exchange, a dozen scientists from Swift Current went abroad on assignments that varied in length from a few weeks to two or more years. Most of them went on assignments with international organizations like FAO and CIDA. They served in such places as Pakistan, East Africa, Iran, and India.

Scientific publication booms

The number of publications put out by the station can be considered as one indicator of productivity. You may recall that the number of scientific journal publications was given as 2 in the 1920s, 20 in the 1930s, 50 in the 1940s, and 61 in the 1950s. In the 1960s 234 scientific publications were produced. This threefold increase in one decade provides a partial answer to the question, "What do you people do out there?"

CHAPTER 7
And in the 70s—our sixth decade

Dr. Bill Pelton
Director
1978–1983

The changes of the 50s and 60s at the Swift Current Research Station were only an inkling of what was going to happen in the 70s. Sixteen new professional staff came either as transfers within the branch or as new appointments. Thirty-one people left: ten transferred out, six retired, five resigned, five were visiting scientists on staff for short periods of time, and five did foreign assignments in third-world countries. Two deaths also occurred during this period.

Sixth director appointed

Art Guitard, the station's fifth director, was promoted in 1978 to the post of director-general of the branch's newly structured Western Region with headquarters at Saskatoon. We had mixed feelings about this move. Although we were proud of Art's success, he developed a habit of taking people from our station to staff his operation. Bill Pelton became the station's sixth director. He transferred to Swift Current from Lethbridge, Alta., where he was assistant director.

Physical changes

Besides changes in personnel, some important physical changes occurred. Permanency dominated the structural improvements. In this decade more of the older frame buildings were replaced by steel or concrete structures. A large steel storage building with a number of overhead doors was built. An open shed cattle feeding barn was erected from steel, concrete pads, and metal tube railings. Additions to the poultry plant were also of steel. Isolated concrete-block buildings were built: one for temperature-controlled storage of seed stock and one for storage of chemicals. Parking lots and roadways were paved or upgraded.

Another obvious structural addition was the large prototype vertical-axis wind turbine on the south farm building site. It was erected and equipped by the Saskatchewan Power Corporation, the National Research Council of Canada, and the Research Branch of Agriculture Canada through this station. The turbine was designed to generate electricity anytime the wind speed exceeded 24 km/h. It was built to rotate at 90 rpm. It had a governor and break system that controlled the number of revolutions per minute to a constant value regardless of wind speed. It was constructed to generate a peak load of 55 kW with electricity fed into the Saskatchewan Power Corporation grid. Like so many prototype devices, the 27-m-high windmill had its problems. About a year after its construction, it spun out of control one night and ignominiously crashed to the ground. Fortunately, no casualties occurred. Much to the delight of the staff, some ingenious person had erected a temporary replacement by the second morning. Made from a plastic Javex jug complete with cut-out fins, it graced the front lawn right beside the flagpole until the director returned from a meeting in Saskatoon and ordered it down. The wind turbine was since rebuilt and is still operating.

More drought-resistant high-yielding wheats

By the early 1970s the cereal-breeding program had further expanded. Ted Hurd transferred from Regina to Swift Current, bringing with him his program to develop high-yielding wheats. Swift Current was made responsible for all wheat breeding and variety testing for the southern half of Saskatchewan. Work continued at the Regina and Indian Head stations under Swift Current's direction. In addition to breeding sawfly-resistant bread wheats, high-yielding wheat and durum wheat, and fall rye, new methods of breeding for drought resistance were pursued. This program was among the first to use computers and specialized machinery for increasing the efficiency of cereal-breeding programs. The triticale breeding program, which was started in the early 70s, developed into one of the largest such programs in Canada.

New durums dominate

Wascana durum wheat was released in 1971. It showed a 10–15% yield increase over current varieties and also had stronger gluten quality. A sister variety of Wascana durum wheat was licensed in 1972 under the name Wakooma. Its even stronger gluten proved to be a significant selling point for Canadian durum wheat in the world market. Then, in 1974, a third new durum named Macoun was licensed. It was described as being an even shorter-strawed variety, earlier maturing, and having a higher weight per volume than earlier ones. These varieties had a ready acceptance by producers and occupied 80% of the durum wheat hectarage in western Canada by the end of this decade.

More progress in spring wheats

In 1974 a new improved sawfly-resistant hard red spring wheat, Canuck, was licensed. Canuck was the fourth improved sawfly-resistant wheat out of Swift Current, preceded by others in 1946, 1952, and 1962. It had improved yield and disease resistance and a quality rated equal to Marquis, the standard of quality for hard red spring wheat.

The variety Sinton, a spring wheat, licensed in 1975, was developed for use in the eastern part of the western prairie region. It was higher yielding than Neepawa on Black soils and was resistant to rust.

These varieties highlight the accomplishments of the cereal-breeding program. But in this period a great deal of other intensive research was conducted. The cereal nursery for wintertime increases of cereals in California, which had been used by Agriculture Canada and prairie universities since the mid 40s, was once again utilized by the Swift Current cereal-breeding group in the early 70s. Shortly thereafter, use was made of a rented nursery site in Mexico as well. Selections made from spring-seeded cereal lines grown at Swift Current were reseeded in these southern nurseries immediately after harvest. In turn, selected material from those nurseries was brought back for spring seeding at Swift Current. This practice still continues and has greatly shortened the turnaround time in breeding new generations and in the time to eventual licensing of new varieties of plants.

Defining the basics

Basic research was conducted during this era in laboratories, growth rooms, greenhouses, and field plots on the rooting characteristics of durum, vernalization techniques with fall rye, photosynthesis analysis procedures, and carbohydrate assimilations in wheat. Drought-physiology studies that assisted in understanding drought resistance made use of new sophisticated techniques such as thermocouple pyschometry (water content) and autoporometry (diffusion rates) procedures.

Staff changes continue

In 1978 Ron De Pauw transferred from Beaverlodge to join the wheat-breeding team and Grant McLeod arrived in the same year to take over fall rye breeding prior to Stu McBean's retirement. Walter Dedio had a 1-year tenure as a durum breeder at Swift Current. Ted Hurd and Stu McBean were seconded to a Zambia post in 1979 with CIDA. Other new professional staff members that joined the cereal group in the 70s included Lyle Wright for a short stay to conduct cereal-harvesting work with Murray Dodds, followed by John Clarke who replaced them on their departure. Tom McCaig arrived as a cereal-quality physiologist, and Doug Cameron, for cereal-production systems and salinity work.

Personnel in the forage research group also experienced some changes in this decade. Bob Lodge transferred to PFRA in 1973 and Jerry Knipfel joined the staff as ruminant nutritionist in 1973, replacing Ebbe Troelsen who had died in 1972. In 1975 John Leyshon came to do the forage management research I had been doing before I assumed the pasture and range work previously conducted by Lodge. In 1977 Y.W. Jame, an irrigation engineer, joined the forage staff and eventually replaced Hans Korven, who transferred to Regional Headquarters in Saskatoon. Jame's work was on forage irrigation. Byron Irvine arrived in 1978 to conduct legume breeding. Dave Heinrichs retired in 1976 after a long-term tenure in forage work.

Quality in oat plants

Three oat varieties were harvested weekly to trace the morphological changes in the plants throughout the season. At 25 cm tall, plants were still composed of 90% leaf fraction. At the boot stage the leaf fraction had decreased to 60%, at heading to 42%, at flowering to 30%, at the milk stage of the kernel to 22%, at the dough stage to 17%, and finally at maturity to 13%. Because the leaf fraction contains higher nutrient content and is more completely digested than the kernels are, these determined values are important considerations in harvesting for feed at the most nutritious stage.

Winter grazing Altai wild ryegrass.

Altai wild ryegrass proves valuable

An ambitious root excavation study showed that Russian wild ryegrass penetrated 1.8 m into a soil profile but that Altai wild ryegrass could go down 3–4 m into the same profile. This finding explained why Altai wild ryegrass is superior in yield persistence in seasonal growth, especially when a water table exists at that depth. The substantial amount of grazeable forage left after seed harvesting of Altai wild ryegrass produced a 30% increase in beef production compared with that achieved with other grasses. In winter, cows performed well grazing on the stubble of Altai wild ryegrass spaced in 90-cm rows, even in fairly deep snow.

Determining and using nutrients in forages

Determination of the amount of digestible energy in various feedstuffs for ruminants was gaining much attention by this time. A laboratory procedure was developed to determine these levels in forage. The amount of forage eaten voluntarily by the animals was shown to be directly associated with the digestible energy content of the feed.

Studies on forage quality demonstrated that even such nutrient-rich crops as alfalfa benefit from early harvesting. Under irrigation, alfalfa at the early-flowering stage was shown to contain equal amounts of dry matter in the leaves and stems, whereas at the full- to late-flowering stage the stems made up 60% of the total yield. Additionally, the nitrogen content in leaves declined 29% between early and late flowering, and in stems the reduction was 49%. These results demonstrated that delayed harvest dates result only in more of the poor and less of the best.

The numbers of stems in stands of Altai wild ryegrass (AWR) were considerably less than those in stands of Russian wild ryegrass (RWR). From June to October leaves of AWR made up from 90 to 70% of the plant yield compared with values of from 70 to 50% for RWR. Protein content late in the season somewhat compensated for these differences in leaf fraction, when AWR fell to 5.5% compared with 7.5% for the RWR.

Ammoniation or pelleting of cereal straw increased its digestibility and intake by ruminants, but the economic justification was questionable.

Forage breeding provides new varieties

Forage-plant breeding, an ongoing area of work, continued through the decade. Two improved varieties of Russian wild ryegrass were licensed in the 70s: Mayak in 1971 and Swift in 1978. These varieties had greater disease resistance, higher yields, and greater ease of establishment than the older variety, Sawki, licensed in 1963.

During this period two more new alfalfas were also developed. The variety Drylander in 1971 was an improved creeping-rooted alfalfa for the production of pasture and hay in the open plains of western Canada. It was a yellow-flowered variety with even stronger creeping roots than the earlier creeping varieties. It also excelled in winterhardiness. The other new variety, Rangelander, licensed in 1978, showed even better root-creeping ability and excellent persistence. It was used almost strictly as a pasture alfalfa. The Swift Current station was recognized as the North American birthplace of creeping-rooted alfalfas over a 25-year period.

The first named variety of Altai wild ryegrass produced anywhere in the world came out of Swift Current. In 1976 the variety Prairieland was licensed. This variety increased the low seed yield of this grass to a level at which it gained acceptance as an alternative to tall wheatgrass, the other good salt-tolerant species.

Irrigation scheduling

A scheduling study of sprinkler irrigation systems on alfalfa hay indicated that the area of land irrigated could be economically extended by one-and-a-half times over that recommended by the manufacturer. On a stand of pure bromegrass for hay, the land base could be doubled using the same sprinkler system.

Improving native grasslands

The merits of seeded pastures were reaffirmed throughout the decade by work done at this station. Native grasslands traditionally produce a gain in liveweight of cattle of from 15 to 30 kg/ha because these pastures have a limited carrying capacity and late spring growth. Fall-seeded rye grazed during the following season produced liveweight gains in beef cattle of 134 kg/ha, Russian wild ryegrass in spaced rows produced a gain of 191 kg/ha, and Altai wild ryegrass, 286 kg/ha. Certainly, seeded pastures were more costly. Land and seedbed had to be provided, costs for seed and seeding were incurred, and a season of grazing usually had to be sacrificed at the start. Station researchers, however, proved that forage production increased by 3, 6, or 10 times. These gains more than warranted the additional cost. The station promoted the use of complementary pasture systems combining selected seeded pastures with native grassland. The seeded pasture provided spring grazing, native grass summer grazing, and other seeded grass fall grazing.

Sewage effluent irrigation proves useful

The Swift Current station became deeply involved in a community concern in the 1970s. The city of Swift Current, like many urban municipalities on the prairies, was using lagoon storage systems for sewage disposal. Evaporation throughout the year had never been fast enough to allow the lagoon to accommodate all the sewage. Therefore the water level in the lagoon was lowered annually by spring dumping into the Swift Current Creek and from there into the Saskatchewan River. Provincial government decreed through the Department of Environment that Swift Current should clean up its act within 5 years. The possibility of using the excess sewage water for agricultural irrigation was favored both by the city and by a few willing farmers. A joint pilot project to determine the practicality and suitability of the water for this purpose was conceived by the city and the station and the plan was put into action in 1973. The city supplied the pumping system, pipe line, wheel-move sprinkler, and land. The station provided the expertise, manpower, and operational management. Water quality, including its physical, chemical, and bacteriological properties and its effect on crop, animals, soil, and atmosphere, were monitored throughout each year. The data showed that the sewage effluent was acceptable for irrigating crops. Considerations included soil salt deposition, leaching through the soil profile, and nutrient load effects on the safety of crops, animals, and humans. As a result of this pilot study, sewage effluent is now used by four area farmers to irrigate field crops. The interdisciplinary team that did this work included forage agronomists, irrigation engineers, soil specialists, an animal nutritionist, and a microbiologist. Widespread interest in this trial has attracted many visitors from across the southern prairies and the northern United States. This station is now recognized as being a foremost source of information and expertise on irrigation with sewage effluent.

above
Gated-pipe irrigation in the 70s.

below
Studies on the suitability of sewage effluent for crop irrigation were done in the mid 70s.

Weather variation and crop production

The Soils Section had evolved earlier into a group conducting work in soil physics, soil chemistry, agrometeorology, soil microbiology, cropping procedures, field husbandry, and fertilizer trials. In the 1970s its endeavors also included environmental studies. George Robertson, an agrometeorology expert from Ottawa, joined the station as head of the section for 2 years. The computer's versatility had opened up a wider field of research. Robertson sent the computer into a frenzy, analyzing 50 years of data on wheat production and the relationship of yield in those years to climatic factors, weather variables, and cropping procedures. He authored the longest scientific paper ever to come out of Swift Current. He showed that despite new varieties, chemical herbicides and pesticides, fertilizers, improved equipment, and improved procedures, the overriding influence on yield production was weather. Weather variation in the 70s still accounted for 73% of variation in realized yield. This finding means that whatever successes we can achieve positively through research, resulting inventions, and better farming must be accomplished with that remaining 27%. Maybe we cannot change weather, but surely we can learn better ways to live with it and to get the most out of it. What do we people do out here? We work on that 27%.

Causes, effects, and relationships in the soil

Through the 70s the soils research group was variously called the Soil Science, Soils and Agrometeorology, Environment, and Soils and Environment Section. For simplicity we will continue to refer to it here as the Soils Section. Changing work emphasis and added disciplines were probably the main reasons for the title changes. New members to the professional staff in the Soils Section included Harmon Davidson and Reinder de Jong in agrometeorology. Much of the soil-related research in the 70s was basic. Significant progress eventually expressed in visible achievements like new crops and better management techniques and procedures depends on this sort of basic research. Obtaining practical results requires an initial determination of causes, effects, and relationships. We must first learn to understand the hows, wheres, and whys. Consequently, the studies of the Soils Section involved both field and controlled laboratory experiments, measuring and relating such characteristics and influences as soil temperatures, soil heat flux, freezing, thawing, soil physical and chemical properties, air temperatures, soil moisture, precipitation, solar and net energy, and microbiological activity of organisms including bacteria, fungi, and actinomycetes. This one paragraph makes reference to a decade of work by a number of scientists. The detailed results obtained and the complex principles elucidated, though difficult to summarize, will surely form the basis for many advances in the years ahead.

Long-term effects of phosphorus fertilizer

One of the things we can understand from the work of the 70s is this station's demonstration of the value of massive applications of phosphorus fertilizer on certain cropland. Read and others showed that 200 kg of phosphorus fertilizer per hectare on phosphorus-deficient soils was as good as or better than adding small amounts annually in stimulating crop yields for many years to come. Massive applications also proved more efficient than annual applications.

Legume inoculant testing

Swift Current was one of four research stations that assumed responsibility for the quality control of legume inoculants being offered primarily by commercial seed companies. The three other stations involved were Sainte-Foy in Quebec and Beaverlodge and Lethbridge in Alberta. Many of these inoculants were from out-of-country suppliers, whose products frequently fell far short of the minimum quality needed to promote effective nodulation of legumes. The Plant Products Division of Agriculture Canada was responsible for accepting or rejecting such material but did not have the microbiological staff or equipment needed for monitoring these products. Thus the job fell to research station experts. Ongoing testing ensures protection to farmers throughout Canada for several legume crops, including alfalfa, clovers, trefoil, sainfoin, peas, beans, soybeans, vetches, and fababeans.

Runoff water quality

Information obtained on the effects of runoff from agricultural fields on water quality during the 70s helped put to rest a myth. High levels of soil-stored nitrogen and phosphorus from chemical fertilizer application were thought to be a source of water contamination. Subsequent studies uncovered a surprising fact. The amounts of nitrogen and phosphorus in runoff water were found to be at levels that exceeded the Saskatchewan water-quality criteria, even from fields where no fertilizer had been added. The legal limits were thus proven too restrictive. Protective guidelines and legislation will probably always require readjustments as new data are obtained.

Where does the nitrogen go?

Scientists in the Soils Section used labeled nitrogen to discover the fate of nitrogen applied in fertilizer to cereal crops. They showed that in stubble crop seeding, 37% of applied nitrogen was recovered in the seed grain, 12% in the straw, 3% in the roots, and 34% in the soil; the remaining 14% could not be accounted for. Under irrigation, 58% ended up in the grain, 13% in straw, 4% in roots, and only 15% in the soil; the remaining 10% was unaccounted for.

Salinity in soils becomes high priority

Salinity in prairie soils had been recognized as being a problem since settlement. Salinity build-up was always a natural phenomenon caused by the alkaline inclination of the prairie soils and the potholes in the terrain. Natural saline collection basins existed even prior to land cultivation. These saline basins were the collection spots for the salts that moved through the soil with the groundwater to lower elevations, and by other mechanisms. Salt collected in these basins because they were land-locked depressions with few or no drainage outlets. Scientists and astute people at large have been concerned about the salinity problem for decades. Alarm gained momentum through the 60s and 70s as salinity problems spread more rapidly as a result of certain farming practices. The station at Swift Current devoted increasing efforts to defining the causes of this creeping plague and finding ways to control its spread and to restore land lost to this blight. Soil scientists at the station played an important part in the work of the Provincial Soil Salinity Committee.

Monitoring salinity levels in soils, determining sources of the salts (recharge sites), determining extent of affected areas (discharge sites), mapping them, and studying the effects of various cropping procedures on the problem were given high priority in the 70s. Much attention was devoted to assessing salt-tolerant crops, determining the effect of selective continuous cropping, diminishing the movement of soil water through the use of interceptor and barrier strip crops in the recharge zone, and studying drainage feasibility. The station staff warned that the problem would not go away. We urged the farming community to fight this insidious scourge collectively. The station also committed itself then to ongoing studies on salinity problems that would continue appreciably beyond this decade.

No cycles in weather

Agrometeorological research encompassed various projects and studies. Attempts to chart climatic trends from 85 years of weather data were still not very successful. Results did not reveal any set cycles over the years. Nothing was obtained that could be useful in any meaningful prediction. These weak results once led Bill Pelton to claim that he could write a weather prediction for any season or year for southwestern Saskatchewan that would be right 90% of the time. His prediction would simply be: dry–dry–dry–dry.

Solar drying

Solar grain-drying devices were first examined at this station in this decade. Although the practicality was questionable considering the large storage bins used by farmers, 27 tonnes of wheat with a moisture content of 20% stored in a solar drying bin equipped with a fan was shown to have its moisture content reduced to 14% in about 20 days.

Conservation of available water

In the dry area of the southern prairies conservation of available water is always a concern. Dugouts and other surface water reservoirs or small dams on farms are common in southern Saskatchewan for conserving water, and seepage from them is undesirable. The Swift Current hydrology staff conducted extensive experimental work on reducing water seepage from these structures. Incorporating sodium carbonate (Na_2CO_3) into walls of the structure was found to be effective for a short period. A method from Russia recommended a gleization process, whereby a straw or manure layer was covered with a thin layer of soil. First trials at Swift Current showed that this system reduced seepage, although it might take a year or two for the layers to consolidate and maximize seepage reduction. By combining the Na_2CO_3 method with the gleization method, an improved immediate seal was achieved. The seal also lasted longer than it did when Na_2CO_3 was used alone.

Another source of water loss from a reservoir of groundwater in a semiarid region is evaporation. Hydrology scientists at Swift Current tested various means to suppress evaporation. Included were windbreaks, floating rafts, and a monomolecular chemical film to cover the water surface, and combinations of these. For the windy southwestern Saskatchewan region the most effective method was a combination of a floating grid raft and a snowfence windbreak. Evaporation was reduced by 30–50%.

Equipment design more sophisticated

In a previous chapter the station's engineers were praised for their efforts in equipment design. Neil McLaughlin transferred to Swift Current from Lethbridge as an agricultural engineer in 1971. Through the 70s the engineers maintained a high profile in machine design and especially in the development of experimental field-plot equipment. They were constantly being challenged to design improved equipment with more automation, more precision, more speed, or more mechanical gadgetry. They responded with improvements in multi-row plot seeders, attachments for volumetric fertilizer dispensing, refinements in self-propelled forage plot harvesters, and modifications or additions to other equipment. For example, individual grain samples from 20 000 to 40 000 cereal-breeding plots had to be individually weighed. Could the engineers make an automatic weighing and recording device? Sure enough, the engineers delivered the hardware that would weigh the samples and punch out the values on computer cards. Throw away those bench scales and pencils! Now the scientists had the weight records of from 600 to 900 plots an hour printed on cards for computing. This sort of ingenuity is invaluable to a research establishment in ensuring most efficient use of staff time.

The engineers were not totally confined to the high-tech society. They also designed and built simple prototype cultivating and seeding equipment for third-world countries where the principal source of power was the draft ox. Scientists, engineers, and agricultural leaders from India spent time at the station working with the staff and picking up ideas. They needed simple designs for equipment in their home countries where tractor power was not readily available.

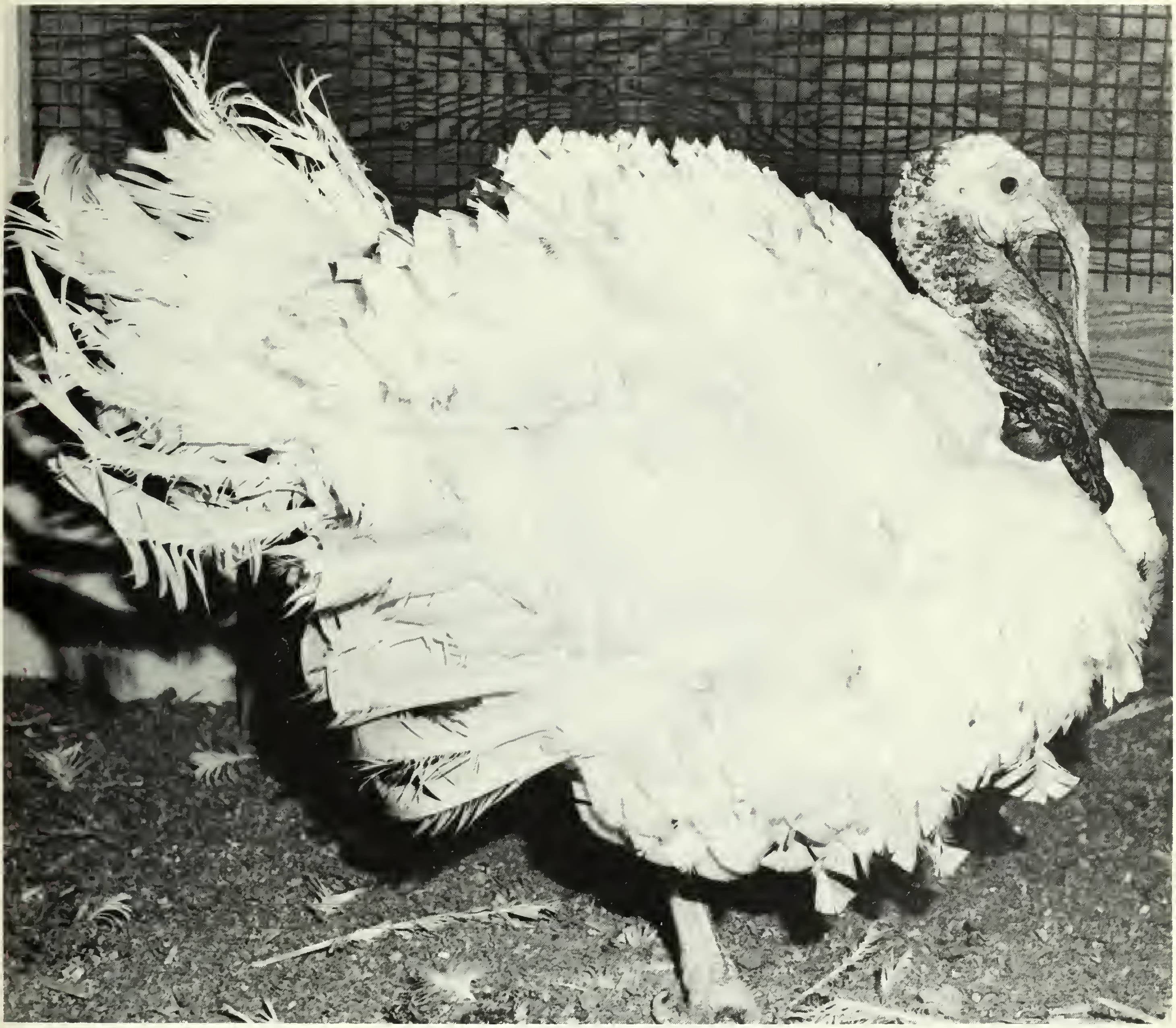
Improving turkeys

In turkey nutrition work, growth rate and feed efficiency were increased by adding fat to increase the energy content of diets. The greatest improvement in growth rate was achieved by adding up to 3% fat to the diet; further additions only served to improve feed efficiency by increasing the energy concentration of the diets.

Of particular importance to turkey broiler producers was the work done to improve carcass quality of these birds. Turkey broilers are slaughtered while still immature and it is difficult to get enough fat, or finish, on them to meet Canadian grading requirements. Diets were developed that improved the quality of finish of turkey broilers. The principles embodied in these diets were made available to feed manufacturers, where they have been used to influence the efficacy of feeding programs available to turkey growers.

An updated feeding standard for heavy turkeys was developed based on feed intake, genetic growth potential, nutrient requirements, nutrient balance, and physiological age of turkeys. Many feed manufacturers across Canada adopted these Swift Current standards in formulating their diets for faster and more efficient growth of turkeys.

A research station, although not a regulatory body, often provides a monitoring service to an entire industry. Experimental results frequently serve to protect consumers and to aid the processors of food commodities. Poultry nutritionists at Swift Current performed this service when they compared commercial diets of five different feed manufacturers. Growth, feed consumption, feed conversion, carcass grade, and production costs for turkey poults fed the different diets varied widely. Chemical analyses of the diets showed that the com-



position sometimes differed significantly from that claimed on the label. Medicated drinking water for poultry was also shown to have no effect on the mortality or feed efficiency of young birds unavoidably subjected to the stress of cold temperatures. These types of results help indicate problems and improve industry standards in this area of agricultural production.

The composition of turkey carcasses was also determined in this decade. Turkeys at 18 weeks old lost the following weight at slaughter: blood 2.8%, feathers 2.9%, inedible offal 10.0%, and neck and giblets 5.1%. When packed in plastic bags with giblets the weight was nearly 85% of liveweight. These results show that turkeys have a high yield of carcass compared with that of pork, which has a 65% carcass yield, and beef, which yields only 55%.

Did you know that lowering the temperature to −22°C for storing frozen turkeys can increase the storage stability time to 8 months or more? The fat in carcasses of turkeys fed vegetable oil rather than tallow tends to become rancid if turkeys are stored for that length of time at only −12°C.

Big turkeys (30 kg), developed in 1975, more of a novelty than a useful improvement.

In the 70s meal from newer types of canola (formerly rapeseed) was shown to have the same feeding value for turkeys as does soybean meal.

That certain breeds of turkeys can be reared to high weights was demonstrated when birds were produced at weights exceeding 30 kg (nearly 70 lb). However, this size is achieved only through a sacrifice in efficiency of feed use, handling ease, and marketability and still comes short of the 100 lb reported in *Reader's Digest*.

Support staff require higher level of training

The station got caught up in the ever-increasing need for more highly trained support staff, as did all facets of modern industry. Whereas in the past an individual often supervised or worked in various areas of research, the trend in the 70s was to demand people trained for specialized areas. Trade school graduates and people with university degrees were being recruited for positions previously staffed by less highly trained people. For example, Gary Winkleman, a chemist who started at the station in the 70s, later succeeded Frank Warder as head of the soil chemistry laboratories; and Karen Wilton, with two degrees, became the new librarian.

A 3-point hitch small irrigation ditch seeder was one of the early results of contract research.

Strong international contributions

The station in the 70s became even more firmly entrenched as an internationally recognized institution of expertise and accomplishment. Our scientists were constantly being called upon to assist in third-world countries, on international committees, and in symposia on many disciplines. Swift Current personnel took part in world grassland congresses, international energy symposia, world soil meetings, international botanical and flora congresses, international agricultural product feasibility studies, symposia sponsored by the World Meteorological Organization and the International Union of Food Science and Technology, and world wheat genetics symposia. Somewhat closer to home, the station provided much of the technological expertise for the Garrison Dam studies because of Canadian concerns surrounding international aspects of water flow quality. These types of national and international obligations put an extra strain on our scientific resources, as they did at other research establishments.

Contract research started

During this time the Research Branch of Agriculture Canada spawned contract research, in an endeavor to have certain short-run research studies and equipment-design projects conducted by the public sector. Because all projects done under contract had to be accounted for by government scientists, some of the station staff had to take on the added responsibility of supervising these projects.

Continuing the transfer of information

Scientific and technical publications through this decade numbered 178. Although the number falls short of the more than 200 publications released in the preceding decade, it does not take into account the many proceedings of symposia and congresses also published throughout the 70s. Our total publishing effort therefore represents a very commendable level of performance in disseminating information to the scientific community, the farming public, and the general public.

CHAPTER 8

And now the 80s—our seventh decade

Although this history only covers the first half of the present decade, several changes in staff have already taken place. Dave Bowden became the station's seventh director when Bill Pelton moved on to become director-general of the Prairie Region of the Research Branch. Bowden had previously been the program specialist of the Prairie Region, and earlier, an animal nutritionist at Lethbridge, Alta. For the first time the station acquired an agricultural economist in the person of Bob Zentner. Mark Stumborg and Doug Campbell filled new positions in energy engineering. John Waddington transferred from the Melfort Research Station to Swift Current as a forage physiologist. Paul Jefferson joined the forage group as a forage physiologist and legume breeder. Gordon Parker from the Saskatchewan Department of Agriculture became the information officer, and Tracy Lund became the computer systems manager. Harold Steppuhn came to conduct subsurface hydrology studies, and Sylvio Tessier came to do tillage engineering. Neal Holt came from the Indian Head Experimental Farm to take over pasture management studies. Dave McAndrew assumed responsibilities for soil fertility studies for 1 year and was replaced by Fernando Selles. Herb Cutforth came to fill the agrometeorology position, and Valerie Stevens was hired as a poultry nutritionist.

These new professional staff replaced others who had departed. Among those were six retirements, four transfers, one resignation, and one death.

Supplementing nutrient levels in forages

Supplementing the diets of cattle on pasture grass with nitrogen was now considered to have potential for increasing cow productivity. To assess the degree to which supplementation would be required, this station pursued studies with some of the most commonly seeded grasses, including crested wheatgrass, Russian wild ryegrass, and Altai wild ryegrass. Analyses of these grasses cut throughout the season showed that nitrogen (N) supplementation would be required on crested wheatgrass pastures after early June to provide the minimum level of N (1.60%) required for lactating beef cows. Russian wild ryegrass could provide adequate N levels until late June before N supplementation was needed. Altai wild ryegrass could hold out until early July. Phosphorus (P) levels proved more critical. The suggested minimum level of 0.32% could be met by the grasses only during the month of May. This finding is another example of how research determines the parameters and develops guidelines to help improve agricultural products and their efficiency of use.

Further definition of range plant–climate relationships

To help select potential wild plants for future domestication, our range ecologist characterized additional plant–climate relationships. He found that particular attention had to be given to the time periods between emergence and maturity for various parts of the Prairie Provinces. This work is an example of how refinements in information are being made for future use.

Retaining alfalfa in pastures

The 80s saw the conclusion of a long-term study designed to show how best to retain alfalfa in a pasture sward in a harsh semiarid climate. By seeding a stand of grass and alfalfa in specific patterns the legume would remain in the stand for 6 or 7 years or more. Instead of growing grass and alfalfa as a mixture in all seeded rows, the two components were separated. For hay production, alternate rows of the grass and legume performed best. For pasture use, the two crops performed best when cross-seeded in widely spaced rows.

More new forage varieties

After many years of development, a new variety of intermediate wheatgrass was licensed in 1980. It was named Clarke in recognition of S.E. Clarke, the forage crop scientist who had made a large contribution to knowledge of forages and their management while working at Swift Current some 40 years earlier. This new variety possesses improved winterhardiness and summertime drought tolerance with a wider range of adaptation throughout the prairies, including the more northern states of the United States.

In 1981 another retired plant scientist was recognized by naming a new alfalfa variety Heinrichs. It is higher yielding than some existing varieties and is adapted to the Brown soils of Saskatchewan and Alberta.

Managing forage crops

To the satisfaction of researchers at Swift Current, controversy surrounding the potential of unimproved native grasses as seed on grazed land was finally put to rest. Some people at other institutions contended that if the same land preparation and seeding methods were used with native grasses as were used for cultivated varieties, then native grasses would produce as well. If this theory was valid, all efforts and accomplishments made through scientific plant breeding would have been wasted. To test the potential of native grasses over a 4-year period, 13 native grass seedings were carefully managed, even to the point of hand weeding the plots. The production of these grasses was compared to that of seedings of domesticated crested wheatgrass, Russian wild ryegrass, and Altai wild ryegrasss. Some of the native grasses failed to establish and the remaining ones produced only fractionally as much as did the domesticated grass seedings. Also, seed procurement for the native grasses was difficult and as much as 13 times more costly. Despite these results native grasses do have a place in animal production and some of them cannot be improved through breeding efforts. But for reseeding of grazing lands, domesticated grasses are superior.

Another matter was resolved in this period. Grazing fall rye prior to harvesting for grain the next year was thought by some to increase grain production; others believed the opposite to be true. Agronomists at Swift Current found that if the crop was grazed closely during the fall of the seeding year, grain harvested the succeeding year was about 15% less. If grazed only in the spring of the succeeding year grain harvested was 10% less. Grazing both in fall and spring had an additive negative effect and yields were 25% lower.

A new wetland plant discovered

Plant collections for the herbarium, field surveys, native vegetation mapping, and related botanical studies continued in the 80s. A wetland plant never before known to exist in the native flora of Saskatchewan was discovered. Known as water-meal, or *Wolffia arrhiza* (L.) Wimm. (Lemnaceae), this plant was found in a half dozen northerly localities. This discovery was a first for all of North America.

Grass breeding and forage-quality assessment continues

Good progress was made during this first half of the eighties in forage plant breeding for improved grass varieties. The objective is to license a new variety of Russian wild ryegrass that will show improved emergence and even greater yield potential. Another variety of Altai wild ryegrass giving both higher fodder and seed yield will also most likely be made available.

In assessing forage quality in breeding and management studies, the Swift Current Research Station continues to utilize live animal digestibility, in vitro digestibility, and laboratory techniques. The in vitro digestion technique is still being used for comparison with results obtained from the more expensive procedures requiring feeding of the animals and for help in predicting feeding quality where only small amounts of forage are available for testing.

In pasture research, ongoing and new studies on pasture management will continue. Despite setbacks in successful legume establishment in existing pastures and rangeland, improved procedures are being developed.

Cereal-breeding momentum increases

As this station is located in Canada's grain-producing prairie region, cereal research will continue to be a major program for some years to come. The 1930s saw a licensed barley variety; the 1940s the first sawfly-resistant wheat; the 50s a second sawfly-resistant wheat; the 60s another sawfly-resistant wheat, a new fall rye, and advances made toward two barley varieties; and the 70s two more spring wheats and three durum varieties. Now, only halfway through the 80s, no less than six new cereal varieties have been developed: Musketeer and Prima fall ryes, Leader and Lancer spring wheats, Kyle durum wheat, and a first-ever, new, class triple-M wheat, HY320.

Musketeer (1980) fall rye has improved lodging resistance and higher yield, and Prima (1984) fall rye has an even higher yield. Leader (1981) spring wheat, a sawfly-resistant variety, has more seed dormancy and better sprouting resistance. Lancer (1985), another sawfly-resistant wheat, has more stem solidness, more root rot resistance, and less seed shattering. Kyle (1984) durum has additional yield potential. Finally, the variety HY320 (1985), a semihard red spring wheat similar in quality to American hard winter wheat and Australian standard white wheats, was developed to capture some of the world market for that type of grain. It is 25–30% higher yielding than the widely adapted Canadian hard red spring wheat Neepawa.

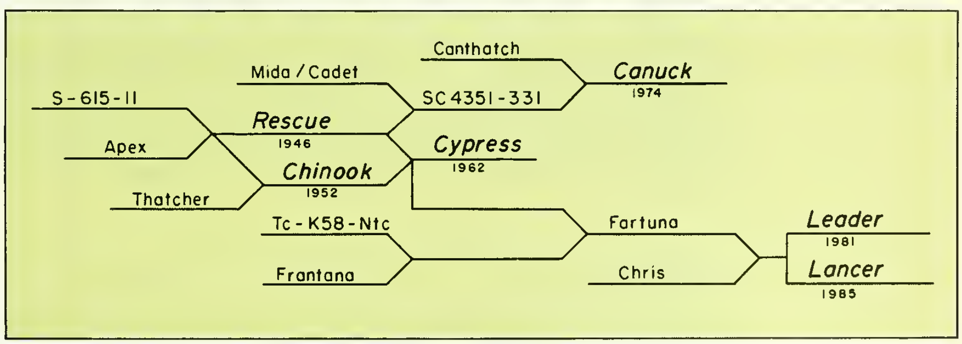
In addition to the new varieties of grains developed for the grain industry, Swift Current cereal breeders made global contributions in the 80s to plant improvement. In cooperation with the research station at Saskatoon nine spring wheat lines with improved resistance to root rot and other improved agronomic traits were developed. These lines were made available to cereal breeders throughout the world. In addition, another contribution in new genetic material made available to breeders of white-seeded wheats was labeled Losprout, a line with improved sprouting resistance.

The major successes achieved by the Swift Current cereal breeders in turning out new varieties should not constitute reason for complete satisfaction. There will always be room for improvement—if not in higher yield, then in one or more of a myriad of other desirable factors. An incomplete list of these other factors might include special quality, drought tolerance, disease and insect resistance, shorter grow-out periods, stronger emergence, sprouting resistance, tolerance to weather variables, winterhardiness, hybridization, and ease of threshing.

Future goals for this station's cereal-breeding program include licensing another improved sawfly-resistant variety of hard red spring wheat and licensing an improved triticale variety. The station also hopes to produce a further-improved solid-stemmed durum wheat and to obtain new information on physiological processes and genetic relationships associated with drought tolerance of grains. This information is needed in order to develop breeding strategies to increase drought tolerance of future varieties.

Effect of temperature, nitrogen, and soil moisture on wheat

During the early 80s further detailed studies were done on the effects of air temperatures, nitrogen fertilizer, and soil moisture on yield and protein content of wheat. This information helped to explain why wheat in southern Saskatchewan commonly contained more protein than that grown in more northerly or easterly parts. Temperature turned out to be the most important factor affecting both protein content and yield, but the relationship was not a direct one. Moderate temperatures gave higher protein levels.



above
A partial view of 30 000 cereal breeding plots in the 80s.

below
The sawfly-resistant wheat story. The ancestry of the latest cultivars released by the station is traced. Leader was licensed in 1981 and Lancer in 1985.

Fertilization of cereals and grasses

Fertilizer placement, especially for the phosphorus portion, had previously been shown to be important. Phosphorus does not move as readily as nitrogen does in soil; therefore placing it below the surface is important in growing grain. What about the effect of drilling in fertilizer on stands of perennial alfalfa? For this crop, the physical damage to the roots from this procedure was found to outweigh any advantage from the fertilizer. Yields were reduced by up to 20% in the first year and some reduction in yield continued for another couple of years.

Massive doses of phosphorus fertilizer had previously been shown to be advantageous for several years for grain production on some soils. Would massive doses of nitrogen fertilizer prove beneficial on stands of grass? Since nitrogen moves readily with moisture, perhaps it would go deep into the soil and contaminate groundwater. But under the semiarid conditions in southern Saskatchewan that was not the

Using a strip of perennial grass (*above*) proves to be an effective snow barrier (*bottom*).

case. At application rates as high as 400 and 800 kg/ha a nitrogen pool occurred at a depth of 30–90 cm in the soil and was available to crested wheatgrass plants for as long as 10 years. That pool never did migrate downward to contaminate the groundwater.

Long-term rotation study

Data collected in the first 12 years of a long-term crop rotation study established in 1967 were analyzed early in this decade. On average, continuous wheat yielded 75% as much as wheat on fallow provided it was fertilized to meet soil test recommendations. A 75% yield from 12 crops planted annually resulted in an actual increase of 53% in yield over that obtained from six crops planted every second year on a wheat–fallow rotation, when the results were averaged over 12 years. Continuous cropping or the use of fall rye in a rotation was also found to minimize nitrogen leaching through the soil profile, compared with the rate of leaching that occurred when fallowing every second year.

Regardless of agronomic advantages, improved soil conservation, and greater grain production from extended rotations, the whole system must be economically advantageous to be accepted by producers. A review of input costs showed that some intensive cropping systems resulted in increased net income. For example, a fallow–wheat–wheat rotation fertilized properly gave the highest net income with a 21% increase. In experimental work researchers usually like to determine the limits to a certain procedure. When a continuous cropping procedure reaches the point of diminishing return, then we back up some. These long-term crop rotations will therefore continue until we reach this limit. Undoubtedly further information will be gained that will permit recommendations that are sound agronomically and economically.

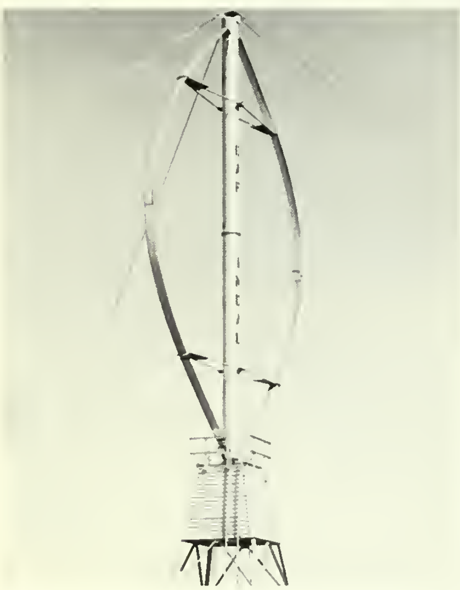
Soil degradation under cropping

In the 80s, the evidence of soil degradation under cropping continued to accrue. At least the problem was becoming more widely recognized. Prairie soils are showing the predictable effect of 60–80 years of cropping practices. Soil scientists at Swift Current have contributed to upgrading estimates of the extent of devastation. Estimates of the loss in organic nitrogen from the soil vary from 30 to 60%. That in itself is a serious situation; but there is something in these figures which is even more alarming. This loss includes two-thirds of the small, microbially active portion of the soil that is responsible for replenishing soil fertility. This fraction is as essential to the vitality of the soil as a regular supply of regenerated blood is to the healthful functioning of the human body.

Saving the moisture from snow

Since first settlement in western Canada, and particularly in the open plains region, man has been concerned about the scarcity of precipitation. If we can learn to trap the 9–10 cm of moisture that falls annually as snow, we could greatly enhance the amount of soil moisture stored. This additional moisture would alleviate the borderline condition for repeated cropping and help to arrest soil degradation from erosion, salinity, and declining organic matter.

At Swift Current agricultural engineers continue to wrestle with ways to keep snow on the fields where potential benefits can accrue. Some progress has been made. Early in the 80s a review of data collected over an 8-year period showed that harvesting grain at variable stubble height can increase snow trapping enough to add a centimetre or two more water to the soil. This increase only represents a tenth of the potential total that could be



above
A zero-till drill built at the station in the 80s. It features cutting colters, a fertilizer attachment for placement with the seed or between seeded rows, and a compaction wheel gang.

below
A prototype for a vertical-axis wind turbine used for electrical generation.

realized from trapping snow, but it does make it possible to second-crop fields successfully in 4 years out of 7 instead of in just 3 of 7. Engineers continue to design and test improved grain swathing deflectors that leave a narrow row of standing grain for subsequent snow-holding on fields.

Zero- or minimum-tillage cropping

Continuous cropping, or some degree of repeated cropping, has introduced new management problems that are being addressed by engineers at Swift Current. New types of seeders are needed for seeding into standing stubble and crop residue, particularly when zero-till drilling of seed is to be adopted. Swift Current engineers designed a new coulter for seed drills, which cuts furrows better than any other available blade. One important feature of this new drill is its ability to minimize soil disturbance, thus helping preserve moisture. In this decade the station is continuing to design and build improved plot equipment for use by researchers at other research stations and institutions.

Supervision of contract research

Engineers from Swift Current have also become increasingly involved in major research and development programs, supervising scientific work done on contract. The programs for agricultural engineering research and development (AERD) and for energy research and development in agriculture and food (ERDAF) are two in which contract research has met with significant success recently.

Achievements include the development of machines for automatic control of depth of cultivation, zero-tillage seeding, and large-bale stacking; sensors for grain-harvester operations; alternative fuel sources; heat exchangers; and grain-drying storage. Many of these developments exemplify the trend toward improved mechanization that incorporates a general concern for conservation and efficiency.

Engineers plan to develop a machine soon that accepts an 11-tonne load of grain, automatically puts it in a bin, and shuts itself down. They also plan to develop an improved blade cultivator with a shorter draft but a better capability for killing weeds. Other goals include improving grain cleaners, heating farm buildings geothermally, obtaining energy from farm wastes, finding alternative sources of fuel, and constructing improved spraying equipment.

Better turkey feed

Poultry nutrition continued in the 80s with increased interest in the effects of mixing nutrient density levels and protein levels in turkey diets. Diets with higher nutrient density were shown to promote faster rates of growth even with a lower feed intake. And in broiler chickens weight gains in young birds were increased with increasing protein levels. Other advantages with higher protein diets include better fleshing, improved grades, and more breast meat, all with less abdominal fat which, of course, is not an edible portion. These diets therefore result in putting the improvements where they can best be used to produce a more marketable product.

Protein levels in diets for turkeys as well as for chickens were reevaluated in view of the increased growth potential of newer strains of birds. Complex feeding programs involving many changes of diets were compared with simple programs. The simple programs were found to produce similar growth rates and efficiencies to the complex diets. However, more frequent changes of diet may be more economical by reducing reliance on costly dietary protein sources when not needed. The suitability of using canola meal as a high protein source in place of soybean meal in turkey diets was demonstrated. Canola meal, a domestic product, is less expensive. The concern that canola might affect meat flavor was laid to rest in these feeding trials.

Research will continue toward making improvements in turkey nutrition programs but we must accept the fact that achievements cannot forever be as spectacular as they have been in the past. Slight increases in efficiency, feed conversions, and performance, however, often constitute the margin between loss and profit.

Continued emphasis on studies of turkey carcass quality led to the finding that yield of edible meat on the carcass is affected by protein content of the diet. Even a small deficit in protein, not large enough to markedly affect growth, may result in a measurable loss in yield of edible meat. Although the loss on a single carcass may be small, when compounded over the entire industry in Canada, the potential loss in efficiency of meat production is significant. This research is continuing.

Scope of information dissemination broadens

The number of scientific publications produced through the first half of this decade alone stands at 150. The number of miscellaneous publications produced is nearly as great. This prolific dissemination of information is augmented by weekly letters; television and radio programs; presentations made at regional, national, and international workshops, advisory boards, coordinating committess, crop associations, councils, and world congresses; and articles published in bulletins or trade journals with a wide distribution. All these avenues are invaluable for informing scientists, food producers, and the public, both nationally and internationally, of the successes we are achieving in agricultural research.

What are we doing out here?

As a parting reminder, on average less than 20% of our earnings are spent on food in Canada, whereas this proportion is 50–100% in many countries of the world. Indeed we are among the 10% of people who enjoy 90% of the world's riches. We mustn't take this enviable position for granted. Our research efforts must continue to strive for improved methods of food production. What are we doing out here? Not only are we working to maintain our advantage in production efficiency, but we are also trying to reach out and share our blessings with others in the global community who are less fortunate than we.

Appendix

Precipitation

Limited precipitation at Swift Current is why the region is grassland in nature, the soils are Brown, the climate described as semiarid, and farming a challenging enterprise. Relatively wet years like 1890, 1915, 1955, and even 1983, make everyone in this region a good farmer. It's the dry years that separate the good managers from the average ones. The bar chart presented here visually tells the precipitation story for the Swift Current area since 1886.

Superintendents, directors, and professional staff, 1921–1985

Superintendents and directors

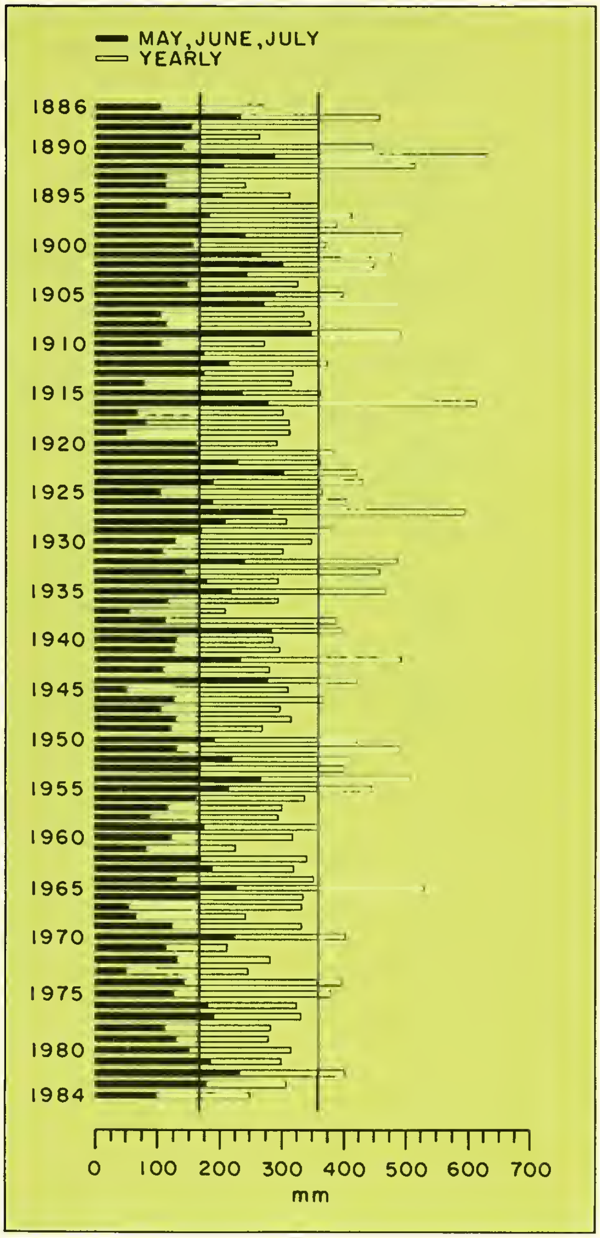
J.G. Taggart	1921–34
L.B. Thomson	1935–48
G.N. Denike	1948–65
J.E. Andrews	1965–69
A.A. Guitard	1969–78
W.L. Pelton	1978–83
D.M. Bowden	1983–85

Professional research staff

The following list includes people with degrees in science or engineering who were appointed to full-time professional research positions. The period of service recorded begins from the time of appointment to a permanent professional position. In several cases during the early years, people in this list and some others worked at the station and planned and implemented research as mentioned in the text while they were employed as student assistants or laborers. Complete, accurate records of employment are not available for these periods of service so these years have been omitted from this list. Also, some graduates who worked at the station for short periods are mentioned in the text but are not listed here because they did not occupy a permanent professional position at the time.

Anderson, C.H.	1963–77
Anderson, L.J.	1938–47
Ashford, R.	1961–66
Ayres, H.D.	1940–51
Barnes, S.	1922–35
Beaton, J.D.	1959–61
Bennett, J.A.	1941–45
Best, K.F.	1950–70
Biederbeck, V.O.	1968–
Bigsby, F.W.	1951–63
Bisal, F.	1942–74
Blakely, R.M.	1936–66
Bolton, J.L.	1936–42
Boving, P.A.	1954–56
Cameron, D.R.	1977–82
Campbell, C.A.	1965–
Campbell, D.W.	1981–
Campbell, J.A.	1937–44
Campbell, J.B.	1938–70
Chandra, P.	1961–63
Chepil, W.S.	1936–49
Clark, K.W.	1954–60
Clarke, J.M.	1977–
Clarke, S.E.	1926–46
Cook, F.D.	1951–57
Cutforth, H.W.	1985–
Darrock, G.	1939–41
Davidson, H.R.	1975–83
Dedio, W.	1973–74
De Jong, R.	1977–78
Denike, G.N.	1926–47
De Pauw, R.M.	1978–
Dodds, M.E.	1948–75
Doughty, J.L.	1936–57
Downing, C.G.E.	1940–42
Driedger, R.L.	1952–54
Dunkelgod, K.E.	1967–84
Dyck, F.B.	1966–
Enns, D.	1952–55
Ferguson, W.S.	1966–70
Fitch, J.P.	1943–53
Forsaith, T.S.	1939–47
Green, D.G.	1967–
Guitard, A.A.	1969–78
Harding, W.M.	1935–41
Hargrave, H.J.	1946–49
Harris, G.K.	1956–62
Harrison, G.B.	1943–56
Heinrichs, D.H.	1938–76
Hinman, W.C.	1947–76
Holt, N.W.	1983–
Horne, D.G.	1940–41
Hubbard, W.B.	1945–48
Hurd, E.A.	1970–81
Irvine, R.B.	1978–81

Jame, Y.W.	1977–
Janzen, P.J.	1935–70
Jefferson, P.G.	1981–
Jenkins, B.C.	1944–48
Jowsey, J.R.	1952–60
Kemp, H.J.	1923–44
Kemp, J.G.	1947–53
Kempton, A.J.	1958–60
Kilcher, M.R.	1949–82
Knipfel, J.E.	1973–84
Korven, H.C.	1948–79
Korven, N.A.	1941–62
Larson, R.I.	1945–48
Lawrence, T.	1954–
Lehane, J.J.	1937–68
Leyshon, A.J.	1975–
Lodge, R.W.	1949–73
Looman, J.	1954–84
MacGregor, H.I.	1948–66
Martens, E.	1945–46
McAndrew, D.W.	1983–84
McBean, D.S.	1940–81
McCaig, T.N.	1977–
McElgunn, J.D.	1967–80
McKenzie, J.K.	1922–29
McKenzie, R.E.	1944–52
McLaughlin, N.B.	1971–85
McLeod, J.G.	1978–
Melvin, R.E.	1949–62
Metheral, P.	1939–41
Milne, R.A.	1937–47
Murray, B.E.	1947–55
Myhr, P.I.	1945–81
Neilsen, K.F.	1959–66
Nicholaichuk, W.	1964–84
Palmer, J.W.A.	1956–58
Parker, J.S.	1946–49
Pelton, W.L.	1958–75
Platt, A.W.	1937–48
Pohjakas, K.	1958–71
Purdy, H.A.	1937–43
Read, D.W.L.	1950–81
Robertson, G.W.	1971–73
Sackville, E.C.	1924–42
Salmon, R.E.	1967–
Schmidt, R.	1938–40
Selles, F.	1984–
Stalwick, A.	1936–41
Stammers, W.N.	1957–58
Staple, W.J.	1936–59
Steppuhn, H.	1982–
Stevens, V.I.	1985–
Stevenson, D.S.	1956–57
Stewart, D.W.	1969–74
Stumborg, M.A.	1980–
Tessier, S.	1981–
Thompson, J.L.	1938–73
Thomson, L.B.	1926–34
Timushka, L.	1955–67
Tisdale, E.W.	1941–47
Townley-Smith, T.F.	1968–85
Troelsen, J.E.	1953–72
Waddington, J.	1984–
Wall, A.M.	1945–48
Warder, F.G.	1938–81
Wells, S.A.	1946–48
Wenhardt, A.	1943–62
Winkleman, G.E.	1973–
Wright, L.M.	1971–74
Zentner, R.P.	1981–



The average precipitation over 99 years (1886–1984) at Swift Current is only 166.6 mm for May, June, and July (solid bars) and 359.3 mm annually (open bars).

Acknowledgments

The following people have helped toward the writing of this history through their reviews, criticisms, suggestions, and corrections.

Bowden, D.M.	Director
Buzinski, S.R.	Cereals (retired)
Campbell, C.A.	Soils
Campbell, J.B.	Author history 1920–70 (deceased)
Caswell, H.R.	Construction advisor–drafting technician
Chalmers, B.	Office manager–accountant (retired)
De Pauw, R.	Cereals
Dyck, F.B.	Engineering
Evjen, G.	Photography
Lawrence, T.	Forage
Myhr, P.I.	Information officer (retired)
Parker, G.E.	Information officer
Smith, M.C.	Farm manager–personnel (retired)
Salmon, R.E.	Poultry
Townley-Smith, T.F.	Cereals
Wiebe, R.	Stenographer–typist