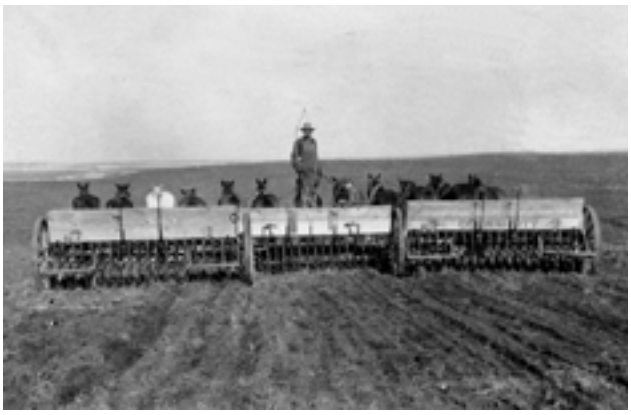
CURRICULUM CONNECTIONS

Biology 20, Unit Four, Agricultural Botany of Saskatchewan
http://www.sasked.gov.sk.ca/docs/biology/bio20u4.html

LESSON PLAN ONE: CLASSROOM INTRODUCTION TO THE THEME

LESSON OVERVIEW

Students will explore Saskatchewan contributions to agriculture between 1905 and 2005, by assuming the role of reporters to create a 100 year retrospective of Saskatchewan agriculture for a popular Saskatchewan farm news show.



Horse-drawn seeding outfit near Abbey, circa 1910. Western Development Museum 1-D(d)-1

RESOURCES AND MATERIALS

- Copies of assignment cards (appendix one)
- Access to library resources and the Internet
- Fast Facts information (at the end of the resource package)
- WDM research documents available at http://www.wdm.ca/skteacherguide/: *Changes in Farming Practices in Saskatchewan, Saskatchewan Weather, Climate and Soils, Beyond King Wheat: Achievements of the Crop Development Centre, The Wheat That Won the West: The Impact of Marquis Wheat Development, The Transformation of Rapeseed to Canola : A Cinderella Story, Agricultural Biotechnology in Saskatchewan, Saskatchewan Contributions to Harvesting Technology, Agricultural Diversification in Saskatchewan, Innovative Implements: The Strength and Legacy of Saskatchewan's Manufacturing Industry, and Grasshopper Campaigns in Saskatchewan During the 1930s.*

PROCEDURE

1. Prepare to teach the lessons on agriculture by reading the documents listed in the Resources and Materials and the Fast Facts section at the end of the resource package.
2. Explain to the students that they will assume the role of reporters employed by a television station that produces a popular Saskatchewan farm news program. This is not a bland and dry farm news show – it is fast-paced and interesting. In honour of Saskatchewan's centennial in 2005, the station wants to produce a 100 year retrospective program to highlight Saskatchewan contributions and achievements to agriculture, and to celebrate how Saskatchewan farmers and researchers have responded to challenges they have faced.
3. Divide students into four news groups. Assign each of the groups one of the following time periods on which to report: 1) 1905-1929 2) 1930-1954 3) 1955-1979 and 4) 1980-2005. For each time period, distribute the corresponding assignment cards found in appendix one.
4. Students are expected to produce a short news segment on the 25 year time period assigned to their group. They must research the topics assigned to them on their assignment cards and create a written script. The script must be properly referenced and turned in for evaluation. The use of audio-visual aids and props should be encouraged.
5. A number of background information documents, written and researched by the WDM, are available at http://www.wdm.ca/skteacherguide/, and are listed above in the Resources and Materials. In addition, a number of pertinent websites and print resources that students may wish to consult are located in the Resources section near the end of this resource package. Students may also wish to consult people in the agriculture industry like research farm staff, Saskatchewan Agriculture and Food staff, local agronomists and others.

ADAPTATION AND EXTENSION

1. Integrate components of arts education to create a set for the news show. Videotape and edit the news segments.

LESSON PLAN TWO: AT THE MUSEUM

LESSON OVERVIEW

Students explore the contents of a discovery box and tour exhibits in the Museum.

RESOURCES AND MATERIALS

- Materials and information sent to you in your Museum tour confirmation package

Using the *Saskatchewan Agriculture: Contributions, Challenges and Opportunities* discovery box, students will learn how and what Saskatchewan agriculture has contributed to Canadian and world food production. Equipped with information, samples and comparisons, students will discover the developments and changes in Saskatchewan agriculture since 1905.

PROCEDURE

1. Prepare to teach and to tour the Museum by reviewing the resources listed. Divide your class into groups before the visit. Discuss the required number of groups with the Museum Programmer when you book your visit. Select other staff members or parents to lead the groups. Advise the group leaders about what he or she will have to do.
2. Students will visit a Western Development Museum in Moose Jaw, North Battleford, Saskatoon or Yorkton. The entire class will assemble for a welcome and orientation.
3. The class will be divided into two, three or more groups depending on the class size. Students will interact with artifacts, replicas and photographs located in a discovery box. A leader's script included in the discovery box will spearhead discussion.
4. The class will tour pertinent exhibits in the Museum using a tour handout to guide their exploration. This handout may be a question-and-answer sheet or scavenger hunt. A tour script for the group leader will be sent to you with confirmation of your Museum tour booking.

LESSON PLAN THREE: WHEN A MUSEUM VISIT ISN'T POSSIBLE

LESSON OVERVIEW

Students will learn more about local agriculture through a classroom visit by an area farmer, agronomist or research scientist, or a class field trip to see a local farming operation.

RESOURCES AND MATERIALS

- Copies of the K-W-L chart (appendix two)

Harvesting in a self-propelled combine north of Chaplin, 2006. Amy McInnis Photo

PROCEDURE

1. Invite a local area farmer, agronomist or research scientist into the classroom to discuss agriculture in your area. If possible, take a class trip to a local operation or research facility. Think in broad terms, as there are many different types of agricultural operations in the province beyond traditional grain and cattle farms, including organic farms, specialty livestock operations, pork, dairy and poultry barns, u-pick fruit/vegetable operations, Christmas tree farms, wild rice harvesting and aquaculture.
2. Prior to the in-class visit or field trip, use the K-W-L model to activate the students' prior knowledge to determine what they already know and what they want to learn from their visitor or visit. A template for a K-W-L chart can be found in appendix two.
3. After the in-class visit or field trip, have students independently fill in the portion of the K-W-L chart about what they learned from their experience. If any items under the W portion of the chart listing what they wanted to learn remain unanswered, direct students to find the answers elsewhere before handing in their completed K-W-L chart for assessment. Students will be expected to reference the sources they used to answer any unanswered questions.

ADAPTATION AND EXTENSION

1. Visit a local museum. Go to www.saskmuseums.org to find museums and heritage sites around Saskatchewan to learn more about agriculture like the Seager Wheeler National Historic Site near Rosthern and the Motherwell Homestead National Historic Site near Abernethy.
2. Have a truly Saskatchewan-made meal or food tasting session. Prepare a wild rice casserole, a Saskatoon berry pie, wheat salad, lentil soup or bison burgers. The possibilities are endless!

LESSON PLAN FOUR: CLASSROOM WRAP-UP

LESSON OVERVIEW

Drawing on knowledge gained by students in the previous lessons, and using critical thinking skills, a class discussion will be conducted to explore the challenges facing the agriculture industry in Saskatchewan, and what possible opportunities have or could be tapped to offset those negative challenges. The brainstorming session should give students an appreciation for the complexity of the issues affecting the industry.

Farmers asking for relief feed for their animals at the Blaine Lake R.M office, winter 1938. Saskatchewan Archives Board S-B8309

RESOURCES AND MATERIALS

- Chalk/white board or flip chart, chalk or markers
- Copies of the Current Events Worksheet (appendix three)

PROCEDURE

1. Introduce the lesson by discussing the important role of agriculture in Saskatchewan. According to the 2006 Census of Agriculture, there were 44,329 farms in Saskatchewan, which occupied 64.3 million acres – approximately 38.5% of Canada's agricultural land. In addition, there are agriculture-related activities in research, processing and farm inputs. Saskatchewan is a national leading producer of wheat, durum, oat, barley, flax, canola, mustard, pea, caraway and wild rice, as well as the world's largest producer of canary seed, mustard, organic wild rice, lentils and dry peas.

2. Explain that agriculture, like any other industry, is strongly interconnected with a variety of factors. These factors affect one another in a reciprocal manner. Ask the students to think about what some of these factors might be and generate a list. Possible answers may include: environmental issues, weather, commodity prices, seed, fertilizer, fuel and chemical costs, transport costs, global food shortages or surpluses, diseases like Bovine Spongiform Encephalopathy, and trade relations with other countries. These are just a few examples to help stimulate the conversation. Discuss how these factors are connected to agriculture, and what positive and negative impacts they could have on each other.
3. In many challenges lie opportunities. Brainstorm about potential opportunities that could be explored to meet those challenges. For example, poor commodity prices and a lack of markets deter farmers from growing a crop well-suited to Saskatchewan's climate. How could this challenge be seen as an opportunity? One possibility may be to develop a market and build value-added processing facilities right here in Saskatchewan to transform the crop into desired products.
4. As a final activity to develop a better appreciation for the complexity of local and global issues affecting agriculture, students will answer a series of questions related to a current issue facing agriculture in Saskatchewan. Using local newspapers, farm publications and the Internet, students should select an article chronicling a current issue in agriculture. Using the worksheet in appendix three, the students will critically examine the local, national and global factors related to the issue they have chosen. Each student should hand in a properly referenced copy of their article along with the completed worksheet.

ADAPTATION AND EXTENSION

1. Investigate the environmental implications of agriculture in more detail as it relates to climate change. A grade eleven and twelve biology mini unit, written by Jane Wilson and edited by Barry Charington, is available from Climate Change Saskatchewan. The mini unit can be accessed online at http://www.climatechangesask.ca/images/Grade_10_12_Mini%20Units.pdf.
2. Soil is an essential component of agriculture. Explore the ways in which soil degradation affects us all with activities from the *Project Soils Activity Guide*, produced by the Saskatchewan Soil Conservation Association and Saskatchewan Environment and Resource Management. Copies of the *Project Soils Activity Guide* can be obtained from Agriculture in the Classroom Sask. Inc. by visiting http://www.aitc.sk.ca, emailing programs@aitc.sk.ca or calling (306) 933-5520.

RESOURCES

- WDM research documents related to agriculture are available at http://www.wdm.ca/skteacherguide/.
- Research documents, historical photographs and www links related to agriculture can be found on the *Celebrating Saskatchewan's Heritage* website at http://olc.spsd.sk.ca/DE/saskatchewan100/.
- Information on all aspects of agriculture from soils to biotechnology, recommended references, lesson plans, a video library and more can be accessed on the Agriculture in the Classroom Sask. Inc. website at http://www.aitc.sk.ca.
- Canadian Grain Commission: http://www.grainscanada.gc.ca/main-e.htm
- Prairie Farm Rehabilitation Administration: http://www.agr.gc.ca/pfra/main_e.htm
- Ag-West Bio: http://www.agwest.sk.ca/
- University of Saskatchewan, College of Agriculture & Bioresources: http://www.ag.usask.ca/
- Saskatchewan Agricultural Hall of Fame: http://www.sahf.ca
- CBC Saskatchewan Centennial Website: http://www.cbc.ca/sask100/en/categories/agriculture/
- Saskatchewan Settlement Experience: http://www.sasksettlement.com
- Seager Wheeler Farm, National Historic Site: http://www.seagerwheelerfarm.org
- Motherwell Homestead National Historic Site: http://www.pc.gc.ca/lhn-nhs/sk/motherwell/index_e.asp
- *The Encyclopedia of Saskatchewan*. Canadian Plains Research Centre, 2005. *The Encyclopedia of Saskatchewan* is now available online at http://www.esask.ca.
- *Atlas of Saskatchewan*. Saskatoon: University of Saskatchewan, 1999.
- Gray, James H. *Men Against the Desert 2nd ed*. Saskatoon: Fifth House Limited, 1996. (1st ed. 1967, Western Producer Prairie Books, Saskatoon)

FAST FACTS

- The practice of summerfallowing was first discovered in Saskatchewan by chance in 1885-86, although its benefits were no doubt discovered many times independently elsewhere. Indian Head area farmer Angus Mackay was unable to prepare and seed some of his land during the spring of 1885 because his horses were being used to haul supplies during the 1885 Northwest Resistance. Periodically the fields were harrowed to keep down weeds. During the dry year of 1886, only Mackay's unseeded, harrowed fields from the year before produced a decent crop. Mackay promoted the practice to farmers in the position of Superintendent of the Experimental Farm for the North-West Territories at Indian Head – a position to which he was appointed in 1886.
- William Richard Motherwell was an important figure in Saskatchewan agriculture for many years. He homesteaded in the Abernethy area in 1882, where he became involved in farm politics. Motherwell was involved in the organization of the Territorial Grain Growers Association in 1901. He began a 12-year tenure as the provincial Minister of Agriculture in 1905 and served as federal Minister of Agriculture from 1921-1930. Motherwell was instrumental in promoting better farming practices during his time in office.

- The development of the early-ripening, high-yielding Marquis wheat, by Dr. Charles Saunders, Dominion Cerealist, in the early years of the 20th century was a key factor in attracting an influx of new settlers into Saskatchewan's southern regions, and expansion of wheat growing areas in the north. Marquis' early maturity gave farmers a better chance to harvest their crop before frost occurred.
- Rosthern farmer Seager Wheeler gained fame for himself, Marquis wheat and the province, when he won the World Wheat Championship at the 1911 New York Land Show with two bushels of Marquis seed. He went on to win again with Marquis in 1914 and 1915.
- Farmers Helmer and Ellert Hanson of Lajord, Saskatchewan were the first to successfully introduce the practice of swathing and swath threshing in 1926. In 1927, an International Harvester Company (IHC) engineer from Chicago visited the Hansons, and evaluated the machines in the field. IHC came out with the first swather in 1928 - the 12 foot McCormick-Deering Windrow-Harvester, which was based on the Hanson's design.
- The Great Depression of the 1930s was made worse in Saskatchewan which suffered from nearly 10 years of drought, severe soil erosion and grasshopper infestations. The southwestern region of the province known as the Palliser's Triangle suffered most. During the 1930s, soil was blown away by the wind in storms called "black blizzards". In Saskatchewan, 1937 was the worst year of the Great Depression. The average yield of wheat in the province was 2.6 bushels/acre.
- Dr. Lawrence Kirk of the University of Saskatchewan developed strains of crested wheat grass that were instrumental in reclaiming abandoned fields and depleted pastures in the drought scourged prairies in the Dirty Thirties, and in other semi-arid areas around the world. In the words of writer James H. Gray, "...few Canadians have ever played so large a role in changing the face of the earth as Dr. Lawrence E. Kirk, and few seeds of grass have ever been so face-changing as the crested wheat grass he developed at the University of Saskatchewan".
- The Prairie Farm Rehabilitation Administration (PFRA), created in 1935, worked through the experimental farms to convert sub-marginal lands to community pastures, reclaim drifting crop land, dig dugouts and construct irrigation projects, and to promote the planting of shelterbelts.
- The application of artificial insemination techniques and the use of frozen semen were important developments for improving dairy cattle. The University of Saskatchewan has been involved in artificial insemination research since the 1950s. Western Canada's first frozen semen calf was born at the University in October of 1955.
- The Crop Development Centre (CDC) in Saskatoon was established in 1971, and has since contributed to Saskatchewan's agricultural economy by developing viable crops suited to the province, giving farmers more options to diversify what they grow and move away from the wheat-oriented focus of the past. The CDC has released over 160 crop varieties since 1977, representing 14 different crop kinds. Included in those is Harrington 2-row malt barley, registered in 1981by CDC scientists Dr. Brian Harvey and Dr. Brian Rossnagel. Harrington has become a world benchmark due to its excellent malting and brewing qualities. In addition, the CDC has become a world leader in pulse research and development. Pulse crop production has ballooned in Saskatchewan from a few thousand acres in the 1970s, to several million acres at present. Dr. Al Slinkard of the CDC is credited with developing the large-seeded Laird variety of lentil which was registered in 1978. Laird has become the most widely known lentil worldwide.

- From an obscure inedible oilseed, to a multi-billion dollar crop, hailed as having the healthiest edible oil on the market today, the transformation of rapeseed into the genetically improved canola is truly a “cinderella” story. Saskatchewan researchers, most notably Keith Downey of the Agriculture and Agri-Food Research Station in Saskatoon, and other researchers from the National Research Council’s Prairie Regional Laboratory (now the Plant Biotechnology Institute) and the University of Saskatchewan, were key players in the development of canola. Through traditional plant breeding techniques, rapeseed was transformed into canola by reducing two anti-nutritional compounds - erucic acid and glucosinolates.
- The Vaccine Infectious Disease Organization (VIDO), formerly known as the Veterinary Infectious Disease Organization, was established in 1975 as a public, not-for-profit research institute, located on campus and wholly owned by the University of Saskatchewan. VIDO is a global leader in food and infectious disease research and in the development of livestock vaccines, with five world vaccine firsts to its credit.
- In Saskatchewan, there is a dramatic trend toward a decreasing number of farms, and a trend toward larger farm size. According to the 1999 *Atlas of Saskatchewan*, farm numbers peaked in 1936 with 142,391 farms. The *2006 Census of Agriculture* recorded 44,329 farms.
- The Crow Benefit was a reduced freight rate for shipping grain. The loss of the Crow Benefit in 1994/1995 stimulated a greater interest in diversification in Saskatchewan, but it increased the cost to farmers of getting their grain to market.
- Saskatchewan is a national leading producer of wheat, durum, oat, barley, flax, canola, mustard, pea, caraway and wild rice, as well as the world’s largest producer of canary seed, mustard, organic wild rice, lentils and dry peas.
- Saskatchewan leads the country with approximately 1,000 organic farms producing a range of organic crops and livestock.
- Specialized livestock, beyond the traditional beef and dairy cattle, hogs, goats, sheep and poultry, are now raised in the province including bison, elk, deer, emu, ostrich, rhea, llama, alpaca, wild boar and several others.
- Saskatchewan has become a world leader in the invention, manufacture and export of equipment to meet the needs of dryland farmers. In tandem with the increased adoption of conservation tillage practices, Saskatchewan farm implement manufacturers have become leaders in the production of equipment like air seeders, straw choppers and spreaders which protect the soil.
- Saskatchewan is Canada’s fastest growing ag-biotech centre, with 30 percent of the industry located here. A strong cluster of ag-biotech research exists in Saskatoon, with research activity by both public and private companies, located in close proximity at Innovation Place and on the University of Saskatchewan campus.

APPENDIX ONE

Assignment Cards

In many different areas of agriculture, from crop and livestock development to machinery invention and manufacturing, the contributions of Saskatchewan people have changed the face of agriculture in the province and beyond our borders. In celebration of Saskatchewan's centennial in 2005, a Saskatchewan Farm News Program is putting together a 100 year retrospective of agricultural achievements in Saskatchewan during our first century. Your research and reporting team is assigned the period between 1905 and 1929. Research and report on the following key achievements, and answer the corresponding questions.

1. The development and release of Marquis wheat to farmers beginning in 1909 was a boon to Saskatchewan agriculture. Why was its development so important to farmers and attracting settlers to the west? What Saskatchewan town is known as its birthplace?

2. Rosthern area farmer Seager Wheeler won the first of his world wheat championships at the 1911 New York Land Show for a sample of Marquis he had grown. Why was Wheeler's win so important? What were his other achievements?

3. Farmers Helmer and Ellert Hanson of Lajord, Saskatchewan were the first to successfully introduce the practice of swathing and swath threshing in 1926. Before this, how was harvesting done, and why did it save on labor and time?

In many different areas of agriculture, from crop and livestock development to machinery invention and manufacturing, the contributions of Saskatchewan people have changed the face of agriculture in the province and beyond our borders. In celebration of Saskatchewan's centennial in 2005, a Saskatchewan Farm News Program is putting together a 100 year retrospective of agricultural achievements in Saskatchewan during our first century. Your research and reporting team is assigned the period between 1930 and 1954. Research and report on the following key achievements, and answer the corresponding questions.

1. A variety of crested wheat grass developed by Dr. Lawrence Kirk at the University of Saskatchewan was important in reclaiming abandoned, drifting fields during the Dirty Thirties. How did it help reclaim fields that were blowing away due to soil erosion and drought?

2. Amazingly, Saskatchewan farmers and scientists, with the aid of the Prairie Farm Rehabilitation Administration, were able to beat back the desert and reclaim eroded farm land in the province. Elaborate on some of the legacy projects supported by the PFRA including community pastures, dugouts and shelterbelts.

3. Western Canada's first frozen semen calf was born at the University of Saskatchewan in October of 1955. The calf was born using a new technique at the time called artificial insemination. What is artificial insemination? Why was it beneficial to improving cattle?

In many different areas of agriculture, from crop and livestock development to machinery invention and manufacturing, the contributions of Saskatchewan people have changed the face of agriculture in the province and beyond our borders. In celebration of Saskatchewan's centennial in 2005, a Saskatchewan Farm News Program is putting together a 100 year retrospective of agricultural achievements in Saskatchewan during our first century. Your research and reporting team is assigned the period between 1955 and 1979. Research and report on the following key achievements, and answer the corresponding questions.

1. The Crop Development Centre (CDC) in Saskatoon was established in 1971. How has the CDC benefited agriculture in Saskatchewan? What variety of malting barley is the CDC known for developing and why? How did the CDC contribute to the development of Saskatchewan's pulse crop industry?

2. Saskatchewan researchers are known for their role in the development of canola in the 1960s and 1970s. Who were these researchers and what did they do? How important is canola in Saskatchewan and the rest of the world?

3. The Vaccine Infectious Diseases Organization (VIDO) was established on the University of Saskatchewan campus in 1975. What kind of research does VIDO do, and what achievements are they known for?

In many different areas of agriculture, from crop and livestock development to machinery invention and manufacturing, the contributions of Saskatchewan people have changed the face of agriculture in the province and beyond our borders. In celebration of Saskatchewan's centennial in 2005, a Saskatchewan Farm News Program is putting together a 100 year retrospective of agricultural achievements in Saskatchewan during our first century. Your research and reporting team is assigned the period between 1980 and 2005. Research and report on the following key achievements, and answer the corresponding questions.

1. Summerfallow acreage is declining in Saskatchewan, and more and more farmers are practicing minimum and zero tillage. What are the benefits of converting to minimum or zero tillage for the farmer and the environment? In tandem with the increased adoption of conservation tillage practices, Saskatchewan farm implement manufacturers have become leaders in the production of equipment to protect the soil. What kinds of equipment is produced here in Saskatchewan to support conservation tillage practices?

2. Saskatchewan is on the cutting edge of ag-biotechnology, with 30 percent of the Canadian industry located in the province. What kind of research activities are going on, and in what city is most of the work centered?

3. In 2004, the Canadian Light Source Synchrotron opened in Saskatoon. What types of agricultural research will benefit from the availability of the synchrotron?

APPENDIX TWO

K-W-L Chart Template

Name:	Subject:
Teachers Name:	Date:

K What I *Know*	**W** What I *Want* To Learn	**L** What I Have *Learned*

APPENDIX THREE

Current Events Worksheet

Title of Article: _____
Publication: _____ Writer: _____
Page Number: _____ Date: _____

Answer the following questions in complete sentences in the spaces provided.

1. Give a brief summary of the current issue facing agriculture in Saskatchewan discussed in your chosen article.

2. Discuss the impact of the issue at the level of the farmer. Are there any provincial, national or international implications?

3. Think of how negative challenges associated with the issue could be turned into positives. Offer suggestions as to how these challenges could be seen as opportunities.