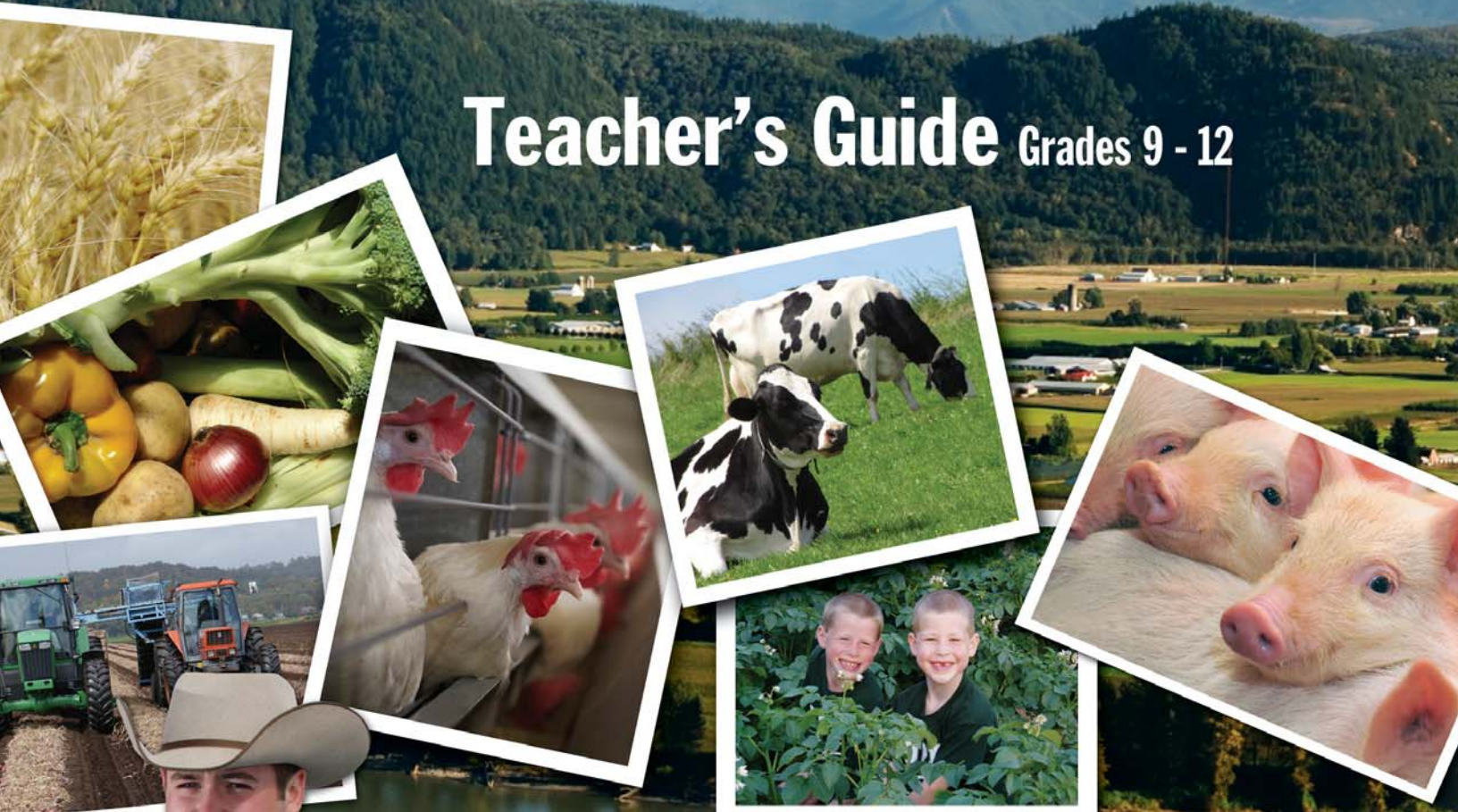


Real The Dirt on Farming^{II}

Teacher's Guide Grades 9 - 12



Real The Dirt on Farming II

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Ontario Agri-Food Education Inc.
L'Éducation agro-alimentaire de l'Ontario



Agriculture
in the Classroom



Territorial Farmers
Association

New Brunswick
4-H Council Limited



Agriculture Education
Prince Edward Island



If you ate today,
thank a farmer
Yukon Agricultural Association

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The ^{Real} Dirt on Farming^{II}

Introduction:

Everyone depends on agriculture and the production of food. In Canada, we have less than 10% of available land on which to grow food. Farmers have the challenge to produce high quality, safe, nutritious food at affordable prices while preserving and protecting resources and the environment. The innovations and increased productivity that agriculture has made have had a tremendous impact on our society. However, at the same time, this technology has also posed some very difficult economic, environmental, ethical, political, food security and food safety questions.

The Canadian government and governments around the world are introducing a wide variety of environmental education and sustainability initiatives as the midpoint of The United Nations Decade of Education for Sustainable Development (2005–2015) approaches (*Acting Today Shaping Tomorrow – A Policy Framework for Environmental Education in Ontario Schools*, Ontario Ministry of Education, 2009, p.3). With our ever-growing global population, it is essential that our agricultural land is protected and that increased food production is done in a safe and environmentally friendly manner.

It is important for each of us to realize that the goal of sustainable agriculture is the responsibility of everyone, not just the farming community: policymakers, labourers, researchers, retailers, and consumers. Each of us contributes our own unique expertise, which makes up the whole; thus strengthening sustainable agriculture.



Teacher's Guide:

This teacher's guide has been developed for grades 9-12 to be used in conjunction with the revised resource, *The Real Dirt on Farming: The People in Canadian Agriculture Answer Your Questions* (2010). It is linked to provincial curricula in the following subject areas:

- agriculture
- environmental studies
- family studies/home economics
- geography
- science
- technological education
- Pan-Canadian Protocol Foundation for science, technology, society and environment.

The purpose of this resource is to provide teachers with teaching/learning strategies which will enable them to present complex, controversial agriculture and food issues in the classroom; thus, providing students with the skills necessary to make decisions.

This resource has been designed with a focus on critical thinking including a variety of teaching strategies, which support and promote differentiated learning, literacy, numeracy, sound environmental practices and student success. Social, economic, political, environmental and ethical issues as they relate to agriculture and food are imbedded throughout the activities.

Activity 1

“Agri-ology” – Do You Know the Terminology?

Students will investigate the terminology used in the student activities for *The Real Dirt on Farming* and the resource booklet. Throughout the unit, students will be able to access the terms on a word wall.

Learning Goals:

Students will:

- Use appropriate terminology correctly as it relates to agriculture.
- Select appropriate print and electronic sources to define the terms.
- Communicate ideas.

Guiding Questions:

- Why is it important to understand agricultural terminology?
- Why is it important to use new terminology correctly?

PLANNING NOTES:

- The Real Dirt on Farming booklet
- Appendix A: “Agri-ology” list of terms
- Create a word wall to support student literacy
- Construction paper with terms – for the word wall
- Blank paper for definitions
- Coloured markers



Teaching and Learning Strategies:

- Teacher provides the students with Appendix A: “Agri-ology”. These terms will be useful throughout all the activities in this resource.
- Using two different coloured highlighters or markers, students draw one line through the terms they know, and circle the terms they do not know.
- Explain that these terms are to be used to build a word wall. This classroom visual will be developed by the class and referred to as needed throughout the entire unit.
- Terms from the “Agri-ology” list are individually printed on coloured construction paper. Arrange students in groups of three or four and provide each group with three to four terms and sheets of blank paper.
- Using a variety of sources (Internet and reference materials), students find the definitions and print them on the blank paper provided.
- Each group presents its “Agri-ology” terms. Definitions are placed under the term on the word wall. Additional words should be added to the word wall as students read and investigate further topics. **Optional:** Students write the terms and definitions in their notebooks for future reference and test purposes.
- At the conclusion of the agriculture unit, students revisit the “Agri-ology” list. Using two new coloured highlighters or markers, students draw one line through the terms they now know and circle any terms that have not learned.

- Students compare what they did and did not know at the beginning of the unit to what they now know at the conclusion of the unit. Teacher leads a class discussion.
- Students choose three new terms from the terms they now know, which they consider to be relevant for them and support their selections with a clear rationale.
- Using a triangular piece of paper, students put one term with the explanation/rationale in each corner.

Assessment:

- Teacher assesses the three new terms and the explanations/rationale for learning.

Enrichment:

- Students create a crossword puzzle, “trivia” game, or word search using the “Agri-ology” list.
- Invite students to try their activity with a peer and generate feedback.



“Agri-ology”

agriculture	genetic engineering
animal husbandry	greenhouse
biodegradable	greenhouse gases
biodiesel	integrated pest management (IPM)
biodiversity	irrigation
biofuels	methane
biomass (energy crops)	monoculture
bioproducts	non-food product
biosecurity	non-renewable energy sources
biotechnology	no-till farming
by-products	pesticides
certified organic	pollination
crop rotation	pulses
ecosystem	renewable energy sources
environment	ruminant
ethanol	traceability
family farms	stewardship
farming	sustainability
feedstock	

Activity 2

Farming – The Big Picture: Do You Know Your Farming Community?

Farming is a way of life as well as a business; it is a unique career. How would one describe a 21st century farmer and farm operation today? Is it different from the “Old MacDonald Had a Farm” image? Many additional careers are linked to farming and agriculture. In this activity, students will investigate farming communities in Canada.

PLANNING NOTES:

- In this activity, “farming community” may refer to local, provincial, and/or national depending on which framework best suits your situation.
- **Note:** To assist students with this activity, use the word wall and review the terms *agriculture* and *farming*.
 - Agriculture is the occupation, business or science of cultivating the land, producing crops and raising livestock.
 - Farming is using land for agriculture, rearing something commercially (animals, birds, fish).
- **The Real Dirt on Farming** booklet (Refer to “Farming – The Big Picture”, pages 2-4)
- **All About Food: Agri-Food Facts** (2008), pages 10 and 17
- **Agriculture at a Glance** – www.statcan.gc.ca
- **Virtual Farm Tours** – www.virtualfarmtours.ca
- Song – “Old MacDonald Had a Farm”
- Children’s book(s) about a farmer or farming
- Chart paper and coloured markers
- Visit a farm (optional)
- Invite a farmer to speak to the class (optional)
- Mythbusting video series – refer to www.oafe.org

Teaching and Learning Strategies:

- To introduce this activity, the teacher creates three learning centres (musical, verbal/linguistic, and visual). Encourage students to select the learning centre which best suits their multiple intelligence or learning styles. Explain that their task is to record their impression of a farmer and/or farm according to the materials supplied.
 - Listen to the song “Old MacDonald Had a Farm”.
 - Teacher reads a children’s book about a farmer or farming. If possible, have a collection of children’s books about a farmer or farming and have students read the books in small groups.
 - Have students draw a picture of what they think a farmer or farm looks like. Display in the room.
- After students complete the opening exercise, they discuss in small groups their interpretation of the song, book and their drawings. This is followed with a teacher-led discussion about the images of farmers and farms that are created in the media and elsewhere. Note: Often myths

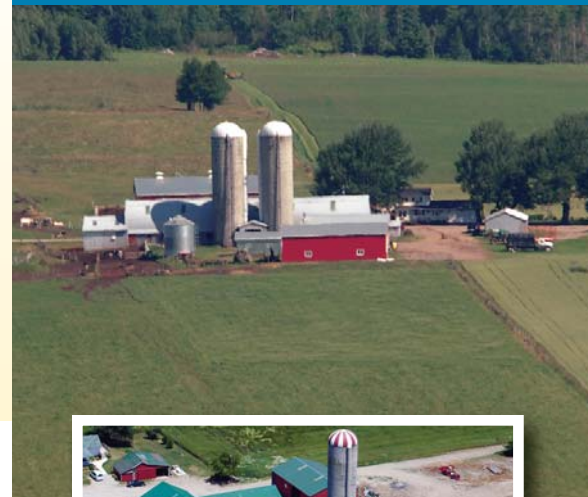
Learning Goals:

Students will:

- Analyze imagery associated with farmers and farms.
- Learn about their farming communities be it local, regional, provincial and/or national (Canada).
- Develop a profile of a 21st century Canadian farmer and Canadian farms.
- Gain an understanding of the career opportunities within a community that are related to or depend upon agriculture.

Guiding Questions:

- What is the profile of a 21st century farmer? Farm?
- What are the many facets of farming today in Canada?
- What careers in your community are linked to farming and agriculture?



are perpetuated based on stereotypes from days past when farms and farmers dominated our land. Today 80% of the Canadian population live in urban centres. (Statistics Canada 2006) .

- Invite students to think about the following question: “What does a 21st century farmer/farm look like?” **Note:** Explain to the students that they will be doing a variety of investigations regarding farming today in Canada, which will then enable them to answer the question.
- Using **All About Food: Agri-Food Facts** (2008), page 10, students define the different types of family farms in Canada. Students read the information on factory farms in *The Real Dirt on Farming* (Refer to “Farming – The Big Picture”, pages 2-4). Teacher-led class discussion to follow.
- Next, have students brainstorm the various types of farms that are in their region or province (e.g., agri-tourism, beef, dairy, field crops, fruit trees, grains and oilseeds, greenhouses, hogs, horticultural crops, lamb, market gardens, poultry, pulses, etc.). Compare this with the “Regional Roundup Chart” (page 4) in *The Real Dirt on Farming*. Students name the major agricultural sectors and agricultural products within their province.
- Working in small groups, students use *The Real Dirt on Farming* (Refer to “Farming – The Big Picture”, pages 2-4), **All About Food: Agri-Food Facts** (2008), page 17 and Statistics Canada – www.statcan.gc.ca to locate information about farm size, farm population, age of farmers, economics of farming (e.g., economic contributions to your province, farmer’s share, cost of doing business), how many people a farmer feeds, land usage, etc. Students create their own graphic organizer to record their information. As a follow up, class discusses their findings.
- In groups of three to five, students create a mind map for the related agricultural careers in their region or province. **Note:** Students write *Related Agricultural Careers* in the centre of their mind map. Each student uses a different coloured marker. Students may wish to use the local phone book (yellow pages) or newspaper to explore the various related agricultural careers in their community (e.g., farm equipment, feed, veterinarian, etc.).
- As a class, students compare their information. What did they discover?
- Teacher refers to the original question, “What does a 21st century farmer/farm look like?”, and then asks the students, “Has your opinion changed?” Explain.

- Using knowledge acquired from these activities, students write an article for their school newspaper or local community newspaper incorporating the debunking of myths and stereotypes that are often associated with farmers and farms, *Profile of a 21st Century Farmer*. Alternatively, students write a newspaper article titled, *Farming the Big Picture – Today’s Farming Community*.

Assessment:

- Use opening activity for assessment for learning.
- While students do their mind maps, teacher needs to provide feedback and encouragement.
- Use mind maps for assessment of learning.
- Teacher assesses the newspaper article for learning.

Enrichment:

- Using the knowledge learned in this activity, invite students to design a survey to find out what their peers, family, and teachers know about the Canadian farmer and/or farming in the 21st century. As a class, decide the number of responses required for each person. Students administer the survey. Individually, students tally their own results. Then as a class, tally the information collected by the class. Use an appropriate graph to display the information gathered. Analyze the results. Make recommendations for future action or research.
- Students further investigate agriculture and analyze the economic, environmental and social impact it has locally, provincially or nationally (Canada).



Activity 3

Predicting Changes in Food and Agriculture

In the early 1980s, futurists such as Wendy B. Murphy (*The Future World of Agriculture*, 1984), were making interesting predictions about the future of farming, agriculture and food production in the next 100 years. Students will examine some of those predictions and assess changes to date. Then, students will make their own predictions about Canadian food trends and demands for the next 50 years. They will need to include how farming and agricultural practices will continue to play a role in meeting the needs of consumers.

PLANNING NOTES:

- ***The Real Dirt on Farming* booklet**
- Collect an assortment of food products or labels such as: a bag from organic carrots, can of soybeans, cornstarch, corn oil, a product made from hemp, a dehydrated product, a freeze-dried product, canned diced tomatoes, hot house cucumbers, turkey bacon. These will represent newer food products and will be used as an introduction to ways that food and agriculture have changed to meet consumer demands.
- Students will need to be in small groups for the introduction. The number of food products or labels that have been collected will determine the size of the groups. One or two labels will suffice for this beginning activity.
- Student Activity 3A: *Making Observations, Inferences and Conclusion Chart*
- Student Activity 3B: *Analyzing Predictions from the Past, Making Predictions for the Future*
- Timelines of changes in farming, agriculture and food preparation:
 - Reference: ***The Challenge of Change, The Canadian Agriculture and Food Industry***, The future: A Culminating Activity, pages 60-63; Appendix 5 - Agricultural Technology Timeline, page 28; Appendix 8.2 - Significant Events in Biotechnology, page 42; and Appendix 9.2 - Significant Events in Food Preparation, pages 47-48 (This resource is available to download from OAFE at www.oafe.org)
- ***All About Food: Agri-Food Facts, (2008)***

Teaching and Learning Strategies:

- Arrange students in small groups of two or three.
- Distribute food products or labels and copies of Student Activity 3A: *Making Observations, Inferences and Conclusion Chart* to each group.
- Invite the groups to complete the charts using their assigned food product(s).
- Discuss the conclusions of the groups' findings as a class. The information in the bottom box will be helpful in guiding discussions and critical thinking.
- Show or distribute copies of timelines that show the progression of Canadian agricultural technology, significant events in biotechnology and significant events in food preparation. (***The Challenge of Change, The Canadian Agriculture and Food Industry***, pages 28, 42, and 47-48). Comment on some of the changes over the years. Invite students to think-aloud about the changes, and the reasons they have taken place.

Learning Goals:

Students will:

- Examine past predictions of food trends and agricultural practices.
- Analyze changing demands for consumer food products.
- Examine advances in agricultural technology, biotechnology and food preparation.
- Predict how changes in technology, the environment and the economy will affect agriculture and food production in the future.

Guiding Questions:

- What predictions were made in the past about the future of farming, agriculture and food production?
- What predictions have occurred?
- How have advances in agricultural technology, biotechnology and food preparation contributed to those predictions?
- What predictions can be made about the future of agriculture and food demands?



- Invite groups to select their choice of the most significant innovation in our history. Allow groups to present their choice to the class with a clear rationale for their group choice.
- Explain the role of futurists and demographers in predicting trends and patterns. Use everyday examples such as those associated with technology, e.g. talking to a friend half way around the world via *Skype*. Explain that in the early 1980s, futurists, such as Wendy Murphy, were making predictions about the future of food, agriculture and farming. Distribute copies of Student Activity 3B: *Analyzing Predictions from the Past, Making Predictions for Future*.
- Read aloud some of the predictions about technology, the use of pesticides and fertilizers, plants and animals, etc. Explain that this list is one example of predictions being made in the early 1980s.
- Use a think-pair-share strategy to challenge students to use *The Real Dirt on Farming* booklet and *All About Food: Agri-Food Facts* (2008) to determine to what degree some of the predictions made in the early 1980s have been reached (a little, some or a lot). Students will need to record evidence that supports their rating.
- Based on their research and class discussions, have students complete the final chart, Student Activity 3C: *My Predictions for the Next 50 Years*, by predicting how changes in technology, the environment and the economy will affect agriculture and food production in the future. Have students consider: Who will be producing food? Where will food be produced? How will food be produced? etc.
- Students share their predictions with other members in the class.

Assessment:

- Collect *Analyzing Predictions from the Past, Making Predictions for the Future* and assess for learning.

Enrichment:

- Within the class, debate the merits of the predictions.



Agricultural Technology Timeline

- 1700s**
- horsedrawn hoe for weeding
 - mechanical seed drill
 - scythe with cradle - could cut .8 ha of grain a day
 - John MacIntosh, Dundela, Ontario, develops MacIntosh apple (1796)

- 1800 -1850**
- development of mowers
 - mechanical reaper - could cut up to 8.1 hectares of grain per day
 - David Fife, Peterborough, Ontario, developed first rust resistant wheat (1804)
 - threshing machine to mechanically separate grain from straw patented
 - inexpensive manufactured fertilizers become available
 - with steel plow, 1 farmer + 1 horse + 1 furrow plow could plow 0 .8 ha per day

- 1850 - 1900**
- horse powered flour mills to grind grain
 - beginnings of hybridization of plants
 - silage cutters and silos
 - centrifugal cream separator
 - steam threshers introduced
 - Daniel Massey started manufacturing basic farm tools (1847)

- 1900 - 1950**
- tractors first appear, and evolve to become lighter, gas powered
 - rubber tires on farm machinery (movement is faster)
 - Dr. Charles Saunders developed Marquis wheat (1907)
 - power operated milking machines
 - an average cow produces 14 litres of milk a day (1960)
 - self-propelled machines, such as combines developed
 - many types of tractor-mounted implements, rather than pulling them with horses
 - 1 farmer + 25 horsepower tractor + 2 furrow plow could plow 2.4 ha per day
 - beginning of frozen food industry
 - half of Canada's farms have electricity

- 1950 - 2000**
- use of electricity on farms became widespread
 - bulk handling of milk on farms
 - great strides in genetics, animal nutrition and farm management practices
 - an average cow produces 27-30 litres of milk a day (2000)
 - farmers more educated
 - more commercial farms
 - transportation greatly improved
 - cheap fuel and chemical fertilizer
 - environmental issues emerge
 - 1 farmer + 100 horsepower tractor + 5 furrow plow can plow 12 ha per day
 - GPS and other satellite technology
 - computer technology

Student Activity 3A: Making Observations, Inferences and Conclusion Chart

Use the food label or package and your background knowledge to complete the chart. Then, provide your ideas for the questions in the lower box.

Observation, Inference and Conclusion Chart

	Directly Observable Evidence (What do you see?)	Inferences (What can you infer from what you see and your background knowledge?)
What is the product?		
Who uses the product?		
Where did the product come from?		
Why was the product made?		
How was the product grown or produced?		
Conclusions		
<p>Would this food product have been available 100 years ago? 50 years ago?</p> <p>Why? or Why not?</p> <p>What has changed about our food and the ways products are grown or produced?</p>		

Student Activity 3B: Analyzing Predictions from the Past, Making Predictions for the Future

Read the predictions made by Wendy Murphy in 1984 (*The Future World of Agriculture*). Then, decide to what degree the predictions have occurred. Use *The Real Dirt on Farming* booklet and *All About Food: Agri-Food Facts* (2008) to help in formulating your decisions. Provide evidence to support your decisions. Finally, make your own predictions for the next 50 years.

The prediction	Degree to which the prediction has been reached <i>Not at all Little Some A lot</i>	Evidence to support the degree to which the prediction has or has not been reached
<p>Technology “The future farmer will supervise his farm from a computer. On some of these farms, remote-controlled machinery will prepare the soil, plant the crops, then check and see that they get enough water and fertilizer. As the crops grow, other machines will eliminate pests or disease that threaten them, then gather in the harvest and send them off to market...” “Future advances in agricultural technology will be paralleled by advances in food-processing...”</p>		
<p>Pesticides and Fertilizers “Fertilizers and pesticides will still be important in cultivating crops; however farmers of the future will be able to tailor their crops by using sophisticated chemicals called “growth regulators.”</p>		
<p>Plants and Animals “Plants and animals that grow better and provide far more nutrition will also be developed through breeding programs. Scientists have already begun to develop cows that provide more milk, beef cattle whose meat contains more protein and less fat, and pigs that provide more pork. Another aim is to develop entirely new sources of food. Plant scientists believe there are new food sources waiting to be developed. These plants may change the diets of future generations, just as the discovery of the American potato and tomato changed the European diet three hundred years ago.”</p>		
<p>New Foods “Numerous new artificial foods - for example, artificial bacon and eggs - will be engineered to accomplish specific health goals, such as lowering cholesterol ... foods may be fabricated from such materials as cottonseed, maple and tobacco leaves, thistles...”</p>		
<p>Other “...farmers around the world have to raise the most nutritious crops and animals possible...they have to do so without poisoning and spoiling the environment and at a cost that makes the food available to everyone...”</p>		

Student Activity 3C: My Predictions for the Next 50 Years

Based on your findings, predict how changes in technology, the environment and the economy will affect agriculture and food production in the future.

Think about...

- Who will be producing food?
- Where will food be produced?
- How will food be produced?
- What will consumers be looking for?

In the next 50 years I predict the following changes for:

Technology	
Crop protection products like pesticides and fertilizers	
Plants and Animals	
Future Foods	
Other Predictions	
Any other comments:	

Activity 4

Ensuring Safe Food Starts on the Farm

Producing safe food is *the* primary concern for farmers. While food safety is critical at every point in the food route from farm to table, ensuring safe food at the first point of entry is fundamental. In this activity, students will explore the connections between on-farm practices, government legislation, and voluntary programs that work together for the future benefit of consumers.

Learning Goals:

Students will:

- Demonstrate an understanding of the role farmers play to ensure a safe food supply.
- Identify legislation and voluntary programs that are designed to protect Canadian consumers.

Guiding Questions:

- What do farmers do to ensure safe food?
- What government legislation and voluntary programs exist to ensure safe food practices on the farm?
- What is the impact for the consumer?

PLANNING NOTES:

- **The Real Dirt on Farming booklet**
- Prepare large index cards with titles that indicate the route from farm to table. For example, use a loaf of bread and the steps outlined in “Making Bread” from **All About Food: Agri-Food Facts** (2008), page 15.
- Review the concept map process as in *Beyond Monet* (2001) or school board websites
- Materials for developing and designing concept maps
- **All About Food: Agri-Food Facts** (2008), pages 11-12
- Appendix B: *Sample Concept Map, Chart of Linking Words and Exit Card*
- Helpful websites: On Farm Safety – www.onfarmfoodsafety.ca; Food Safety Network – www.foodsafetynetwork.ca; www.virtualfarmtours.ca

Teaching and Learning Strategies:

- Call for student volunteers according to the number of prepared index cards.
- Distribute prepared index cards to student volunteers and then invite students to arrange themselves in a progressive line that shows the process of the food from farm to table. Students will need to collaborate with one another to determine the steps. Involve remaining students to check their peers’ “line” with a “thumbs up” or “thumbs down.”
- Explain to all students that there are many steps in moving a farm-grown or produced product such as wheat, tomatoes, or chicken from the farm to our tables. At each step, food safety is critical. To reinforce this point, have students review the food safety pages in **All About Food: Agri-Food Facts** (2008), pages 11-12.
- Teacher then explains that to understand more fully the role that farmers take with on-farm practices and the connections to government legislation, and other programs, students will work in small groups to develop concept maps titled *Ensuring Safe Food Starts on the Farm*.
- Conduct a quick assessment to determine students’ level of understanding of concept maps. Clarification may be needed, exemplars will be helpful. (Refer to Sample Concept Map in Appendix B.)
- Instruct students to use **The Real Dirt on Farming** booklet as the basis for finding information about food safety on the farm. Students could use sticky notes or index cards to record their findings with one point per sticky note or card. In addition, suggested websites and other resource materials may be useful.
- Once points have been acquired, students should start to categorize them into key concepts. Alternatively, provide students with possible key concepts, e.g., animal care, crop care, government legislation, voluntary programs, and consumer impact.
- Students then arrange their concepts and points in an arrangement on chart paper or heavy paper.
- Finally, students draw lines and add linking words or phrases to show connections between farm practices and legislation, etc. For example, the Canadian Cattle Identification Program connects to the on-farm practice of tagging all calves born on farms (animal care). A linking word might be *traces or follows*. Similarly, Integrated Pest Management (crop care) links to an alternative strategy (program) that works with nature to control disease and pest levels. Linking words might be *widely used or reduces pesticides and environmental footprint*. (Refer to the Sample Chart of Linking Words in Appendix B.) Encourage students to be creative in linking farm-related food safety practices. Colours, graphics and drawings enhance the demonstrated learning.
- Display finished products or conduct a walk about so that students can review each other’s work.
- To conclude the activity, assign exit cards for individual reflection and evaluation. (Refer to Sample Exit Card in Appendix B.)

Assessment:

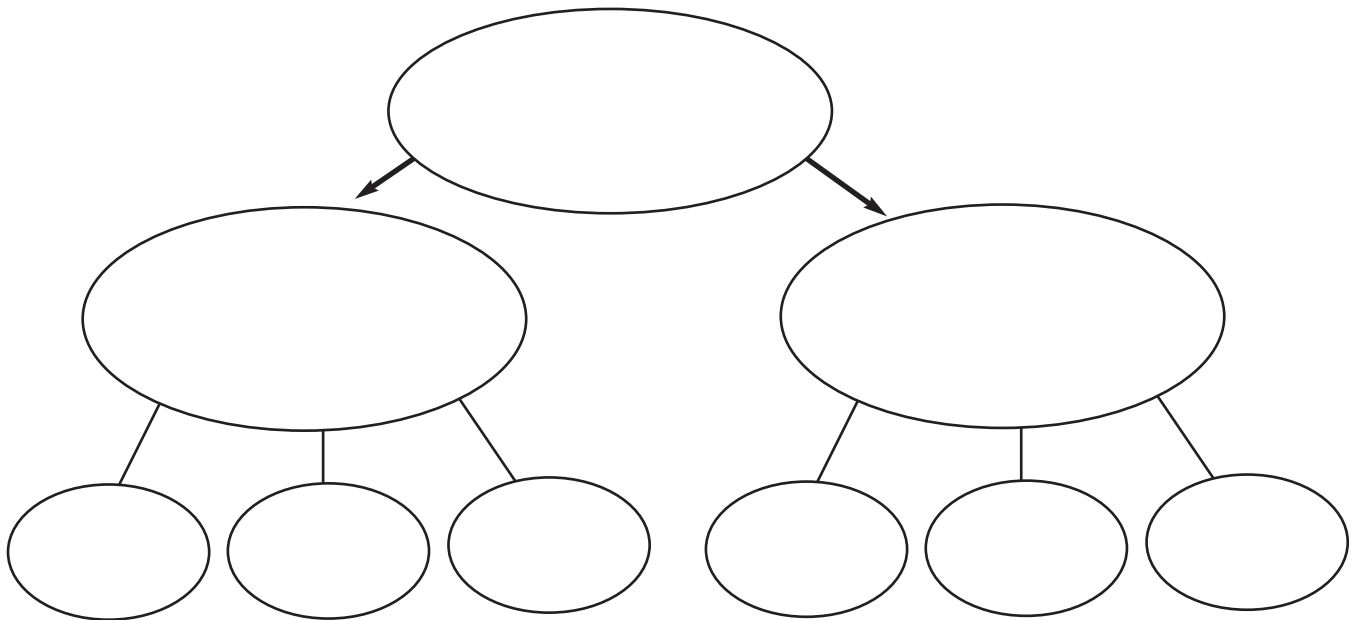
- During the development of the concept maps, the teacher needs to be vigilant in providing feedback and encouragement.
- Concept maps may be assessed for learning using generic rubrics for concept maps.
- Use exit cards as assessments of learning.

Enrichment:

- Students interview a farmer.
- Students visit a farm.
- Students visit a food processing plant (operation).



Generic Concept Map



Linking Words for Concept Map

Accordingly	Causes	Features	Involves	Satisfies
Adds to	Combines	Follows	Joins	Shapes
Are like	Concludes	For example	Leads to	Shares
As a result	Connects	Generates	Makes	Subsequently
Assists	Consequently	Illustrates	Merges with	Thus
Begins	Describes	Includes	Outlines	Translates
Can effect (cause)	Determines	Incorporated into	Produces	Unites
Can affect (change)	Encourages	Influences	Provides	Wherefore

Exit Card

1. In my opinion, the three best things that farmers do to ensure a safe food supply include... because...
2. The government legislation *or* program that most impresses me about farm-related food safety is: _____ because...
3. A message that I would like to send to Canadian consumers about the role that farmers play to ensure food safety is...

Activity 5

Agriculture is Everywhere – So Much More Than Food



When we hear the word food, many of us think of agriculture, but agriculture is so much more than just food! There are bioproducts or renewable resources as well as by-products or non-food products. Students will increase their knowledge and understanding of bioproducts. They will investigate the various bioproducts we are currently using as well as new products currently being tested. Students will also investigate how Canadian farmers are working to provide sustainable resources for all Canadians; the types of products agriculture has made available and is continually developing to reduce our dependency on materials that are not renewable or sustainable. Yes, agriculture is everywhere!

Learning Goals:

Students will:

- Evaluate the importance of using sustainable plants for Canadian society as well as globally.
- Assess the impact of using bioproducts or renewable resources along with non-food products or by-products on society and the environment.

Guiding Questions:

- What are renewable resources?
- What are bioproducts (e.g. biofuels, energy crops/biomass, etc.)?
- What are non-food products or by-products?
- Why is the use of bioproducts or renewable resources important to our environment?

PLANNING NOTES:

- **The Real Dirt on Farming booklet** (Refer to “So Much More Than Food”, page 30)
- *Growing for a Sustainable Future: Ontario Agriculture and the New Bioeconomy* (available to download from OAFE at www.oafe.org)
- **All About Food: Teacher’s Guide** (2008), page 33
- *Sustainability and Stewardship: Protecting Agriculture’s Future* (OAFE Update Newsletter #61, Fall 2009 - available to download from OAFE at www.oafe.org)
- Student Activity 5: “BIO” Trivia Questions: *Can you find the answers?*
- Arrange for the computer lab
- Chart paper and markers
- Where’s Agriculture – www.wheresagriculture.ca



Teaching and Learning Strategies:

- Pose the following questions and refer to the “Agri-ology” word wall: “What does agriculture mean?” “Do you remember what the term bioproducts means?” and “What are by-products or non-food products?”
Note: Bioproducts are grown for a specific purpose, while by-products are waste from agricultural products grown or produced for another purpose.
- For review purposes, students working in small groups will brainstorm the meaning for each term. Students summarize their brainstorming and show how the three terms (agriculture, bioproducts and by-products) are connected; thus, capturing the fact *Agriculture is Everywhere*.
- Students write a cinquain for each of the terms. **Note:** A cinquain is a five-line verse. The first line has one word (title). The second line has two words (describe title). The middle line has three words (an action of the title). The fourth line has four words (statement of feeling). The fifth line is one word (synonym of title). Students share their cinquains.
- Invite students to complete the “K” and “W” sections of a KWL organizer for *bioproducts* and *by-products*. Have two columns under each section (one column labelled bioproducts and the other column labelled by-products).
- Teacher leads a class discussion as to what the students know and what they would like to know. In small groups, students use **The Real Dirt on Farming** booklet (Refer to “So Much More Than Food”, page 30) to complete Student Activity 5A: “BIO” Trivia Questions: *Can You Find the Answers?* Students share their answers.
- Divide the class into small home groups with three students per group.
 - Each member of the group will research one of the following topics and become the expert for the home group.
 - Biofuels (e.g., biodiesel and ethanol)
 - Biomass/energy crops (e.g., switchgrass and miscanthus)
 - Household bioproducts (e.g., hemp, flax and corn)
 - Students form their expert groups and research their specific topic using **The Real Dirt on Farming** (Refer to “So Much More Than Food”, page 30), **All About Food: Teacher’s Guide**, page 33, *Growing for a Sustainable Future: Ontario Agriculture and the New Bioeconomy* and the Internet.
 - Students create an organizer to include the following:
 - Relationship between the original product, the products made from it and the product it replaces (e.g., corn – ethanol and gas)
 - How the product is produced.

- Two challenges or issues connected with producing the product.
 - The environmental impact the product has on our daily lives.
 - Where or how the products are used in our daily lives (e.g., home [garage, living room/dining room, bedroom, bathroom, kitchen, overall structure], work, school, play, cosmetics/toilet articles, pharmaceuticals, snacks/food, etc.).
- Students record their information on chart paper.
 - Each expert group prepares a summary of their findings.
 - Students return to their home groups and share their information with each other. Students record the information for each of the three topics. Teacher-led discussion to follow.
- **Note:** There is a global debate as to whether or not we should be using crops for non-food products such as fuel since we have a growing population, which must be fed. Teacher poses the question: Should we be using crops for non-food products? Discuss and/or have a debate.
 - Invite students to arrange themselves into six groups. To further explore the topic, *Agriculture Is Everywhere – So Much More Than Food*, students will investigate the various by-products or non-food products derived from farm commodities that we use in our daily lives (at home, work, school, play). Assign one of the following commodities to each group: canola, cattle, corn, hogs, sheep and soybeans. Students use *The Real Dirt on Farming* (Refer to “So Much More Than Food”, page 30), *All About Food: Teacher’s Guide*, page 33, and the Internet. Students record their findings on chart paper.
- Each group posts their findings in the classroom. Students do a walkabout. A teacher-led discussion follows the walkabout to learn what has been discovered.
 - Using the knowledge they have acquired through the group activities, students complete a Venn Diagram, *Bioproducts and By-products: Where Does it all Fit?* Students label the three circles: Bioproducts, By-products and Bioproducts and By-products.
 - Students complete the “L” section of the KWL organizer and write a reflection on what they have discovered, and the impact this will have on their day-to-day choices.

Assessment:

- Teacher assesses Venn diagram for learning.
- Use student reflection for an assessment of learning.

Enrichment:

- Students investigate at home to discover what bioproducts are being used in the different areas of their home (e.g. kitchen, bathroom, garage, laundry, dining room, living room, bedroom, family room).
- Individually, students complete a rating chart (1 – 10), “Where Do I Stand?” “How Should Bioproducts Be Used?” and support their response.

Student Activity 5: “BIO” Trivia Questions: Can You Find the Answers?

1. What is ethanol made from?
2. What is biodiesel made from?
3. Why are biofuels considered “carbon neutral”?
4. Which country is a leader in ethanol production?
They are using _____, which produces more biomass per acre than any other crop in the world.
5. In Canada, farmers are growing two biomass or energy crops experimentally. They are _____ and _____.
6. In a typical grocery store, approximately how many items are made from corn?
7. How many acres of corn does it take to produce enough fuel to drive across Canada?
8. Why is canola and soybean oil being used as engine oil and lubricants?
9. Animal fat may someday be the “fat” that we purchase at our local gas station. Why?
10. How much fuel does one bushel of soybeans produce?

Activity 6

Farmers – The Active Environmentalists

Sustainable agricultural practices play a major role in food security. These practices are generally concerned with the need to be economically viable for the farmer while meeting human food needs. In recent years, the impact on the environment has become a major concern.

In this activity, students will learn that Canadian farmers are active environmentalists. Their livelihood and way of life are intensely connected to soil, water and air. Their practices contribute to food security in Canada and the world, today and in the future.

To demonstrate their learning, students will plan a proposal for an infomercial. It could be used to inform peers about the role farmers take in practicing environmental sustainability.

Learning Goals:

Students will:

- Demonstrate an understanding for environmental consciousness.
- Examine agricultural practices in Canada that support food security, sustainability and the environment.
- Plan a proposal for an infomercial to educate peers about the role farmers take in practicing environmental sustainability.

Guiding Questions:

- What are sustainable agricultural practices in Canada?
- How do these practices support Canadian farmers, food security and the environment?

PLANNING NOTES:

- **The Real Dirt on Farming booklet**
- Materials for simulations outlined in Appendix C:
 - Apples, knives and cutting boards
 - 10 L container of water, measuring cup, several small bowls or containers
- Mechanisms to post key terms and definitions e.g. chart paper, Smartboard, etc.
- The final task requires students to plan a proposal for an infomercial. This task could be set up by the teacher as a type of tender (bid/offer) that is common in many lines of work. Students only create the proposal.
- *Sustainability and Stewardship: Protecting Agriculture's Future, OAFE Update Newsletter #61, Fall 2009*
- Student Activity 6: Agricultural Practices – Managing Stewardship and Sustainability for Food Security
- Useful websites:
 - Protecting Crops from Pests: www.statcan.gc.ca/pub/96-328-m/2004011/4225114-eng.pdf
 - United Nations Educational, Scientific and Cultural organization: cms01.unesco.org/en/esd/themes/environment/
 - What is sustainable agriculture? www.statcan.gc.ca/pub/96-328-m/2004017/4193991-eng.pdf
 - World Health Organization: www.who.int/trade/glossary/story028/en/

Teaching and Learning Strategies:

- Teacher leads a community circle activity to determine students' knowledge and understanding about food security, sustainable agriculture and the environment.

Teacher prompts: To me food security means... To me sustainable agriculture means... When I hear or see the word "environment", I think of...

Teacher should summarize the group's ideas.

- Teacher conducts *The Earth as an Apple* and/or *Water and the Environment* activities as outlined in Appendix C.
- Teacher explains that the kinds of food and the amounts of food we eat every day are reliant on farmers and how they manage the land, water and air for use now and in the future. This is *stewardship*.
- Post the following definition for *stewardship*: the managing, conducting, and supervising, or looking after of something, the careful and responsible management of something entrusted to one's care. For a farmer, this means the responsible care of land (soil), water, air, insects, and animals. Invite students to record the definition in their notebooks and to highlight what they consider the most important part of the definition.
- Repeat the process for *sustainability*: to keep in existence, to maintain, prolong **or** development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Repeat the process for *food security*: when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life.
- Using a think-pair-share strategy, ask students to consider similarities and differences in the terms.

- Invite students to use *The Real Dirt on Farming* booklet, other available references and Student Activity 6: *Agricultural Practices – Managing Stewardship and Sustainability for Food Security* to determine which of the practices used by farmers today support stewardship, sustainability and/or food security. Students will need to justify their decisions.

Note: All areas may apply depending on the justification that is made.

- Use the reflections at the bottom to generate a class discussion and summary of the activity.
- This final task requires that each student use their acquired knowledge and understanding to plan a proposal for an infomercial that could be used to inform peers about the role farmers take in practicing environmental sustainability. The proposal should include a plan for a creative format such as a blog, a YouTube type presentation, or a television or radio insert as well as the desired key points.
- Provide an opportunity for peer editing of the proposals before final submissions for teacher evaluation.

Assessment:

- Assess *Agricultural Practices – Managing Stewardship and Sustainability for Food Security* for student learning and understanding.
- Evaluate infomercial proposals as students apply their learning in new ways.

Enrichment:

- Students put their infomercial proposals into action.



The Earth As An Apple

As you do this activity, consider the earth as an apple.

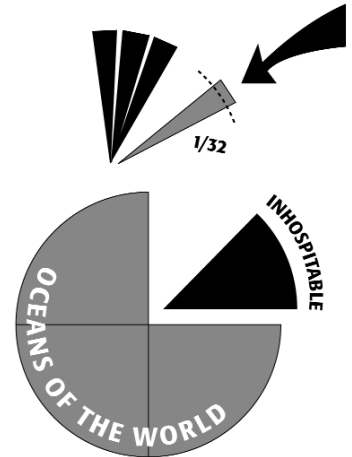
Cut the apple into quarters. Set aside three quarters. These three quarters represent the oceans of the world. The total land mass on earth is represented by the fourth quarter.

Slice the fourth quarter in half. This gives you two $\frac{1}{8}$ th pieces of the world. Set aside one of the pieces. This $\frac{1}{8}$ th slice represents the land that is inhospitable for people (polar caps, deserts, swamps, high altitude, rocky and mountainous areas). The second $\frac{1}{8}$ th piece of apple is the land area where people live, but it is not necessarily where the food is grown, which we need for life.

Now slice the second $\frac{1}{8}$ th piece of apple into four sections. This gives you four pieces, each representing $\frac{1}{32}$ nd of the earth. Set aside three of the sections all of which represent areas that are too rocky, too wet, cold, and/or steep as well as soil that is too poor to actually produce food. These three sections also include the areas of land that could produce food, but they do not because the land is buried under cities, highways, suburban developments, shopping centres and other structures that people have built.

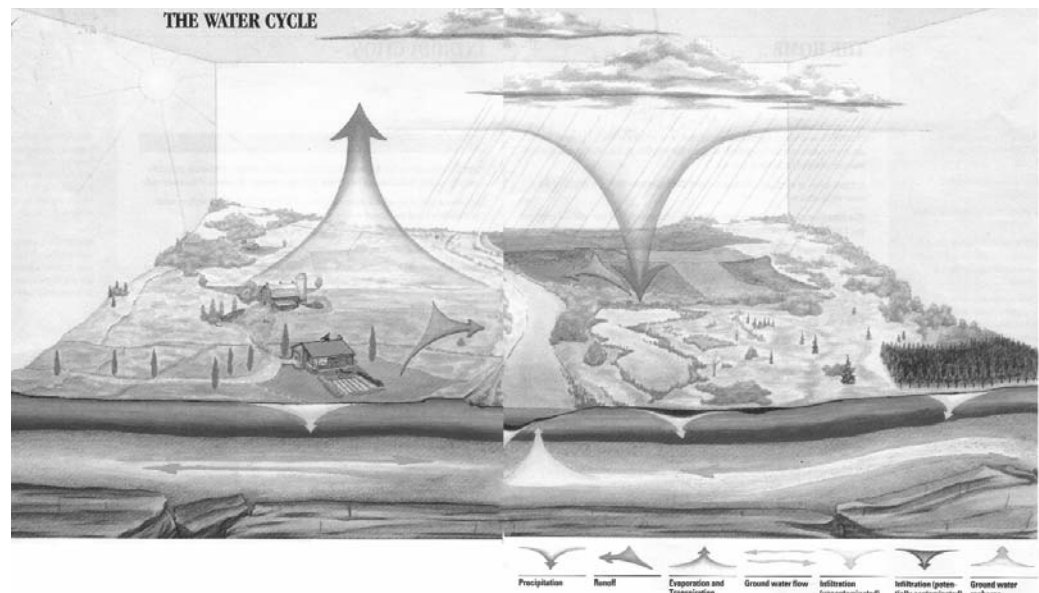
This leaves the world with one $\frac{1}{32}$ nd slice of the earth. Carefully peel this slice. The tiny bit of peeling symbolizes the earth's surface; the very thin skin of the earth's crust upon which humankind depends. The earth's crust is less than five feet deep; it is a fixed amount of land, which produces the food we eat.

When you visualize how small the amount of land is that we used to produce the food we eat, it becomes very clear why it is important for us to protect the land — our resource. Advanced agricultural technology has enabled the world to feed many of its people. Thus, with a fixed land resource base and an ever-increasing number of people trying to feed themselves from this fixed resource base, each person's portion becomes smaller and smaller and more important to the individual person. We must protect the environmental quality of our air, water, and land.



The Environment: Water

1. Use a 10 litre container to represent the entire world's water.
2. Using a measuring cup, remove 0.3 litres (300ml or 3%) to represent fresh water, as the rest is salt water.
3. From the 300ml remove 200ml, which represents fresh water that is frozen as polar ice caps or glaciers. The remaining 100ml is fresh water of which 99ml is groundwater and 1ml (1 drop) is surface water.



Water by percent — 97.20 % is salt water, 2.15% is ice, .63% is ground water and .02% is surface water (lakes, rivers)

What are the implications of this simple activity in terms of your provincial agri-food system?

Student Activity 6: Agricultural Practices – Managing Stewardship and Sustainability for Food Security

Use the *Real Dirt on Farming* booklet to examine current agricultural practices that demonstrate environmental responsibility. Then place a (✓) in the appropriate column if the practice contributes to stewardship, sustainability and/or food security. Justify your decision in the final column.

Agricultural Practice	Stewardship	Sustainability	Food Security	Justification
Environmental Farm Plan Program				
Promoting and protecting biodiversity				
Crop rotation				
Nutrient Management (manure)				
Integrated Pest Management				
Tillage				
Harvesting the sun				
Farming the wind				
Biotechnology				
<p>In my opinion, the agricultural practice that best supports environmental sustainability....</p> <p>I say this because....</p>				

Activity 7

The Real Dirt on Farming “R-A-F-T” Assignment

The Real Dirt on Farming booklet begins with a letter from Canadian Farmers. The student’s overall task is to prepare a response to the letter to demonstrate their acquired knowledge and understanding of farming and agriculture in Canada today. To do this, students use a “R-A-F-T” strategy whereby they choose a role, an audience, a format and a topic. The Real Dirt on Farming will be the primary reference along with suggested websites indicated throughout the resource.

This assignment has been designed as a culminating activity for this teacher’s guide. It can also be used as a stand-alone activity and assignment.



Learning Goals:

Students will:

- Summarize an acquired knowledge and understanding of farming and agriculture in Canada today using *The Real Dirt on Farming*.

PLANNING NOTES:

- *The Real Dirt on Farming* booklet
- Depending on students’ choices for their “R-A-F-T”, computer labs may be required.
- Student Activity 7A: *The Real Dirt on Farming “R-A-F-T” Assignment*
- Student Activity 7B: *Graphic Organizer for The Real Dirt on Farming “R-A-F-T” Assignment*

Teaching and Learning Strategies:

- Review *The Real Dirt on Farming* booklet with students. Depending on prior usage, this review may be a scavenger hunt, a simple scanning of the pages, a review of the table of contents, a look at the pictures, etc. A word-association game may be another introductory activity.
- If necessary, explain the concept of a “R-A-F-T” assignment.
- Distribute copies of Student Activity 7A: *The Real Dirt on Farming “R-A-F-T” Assignment* and Student Activity 7B: *Graphic Organizer for The Real Dirt on Farming “R-A-F-T” Assignment*.
- Students then make their choices taking into consideration their interests, learning preferences and strengths. Students may choose to do one line completely across or they may choose to make a more random selection.
- Guide students to use the graphic organizer to help in fulfilling their “R-A-F-T” choices and final product. Their chosen role and audience must be kept in mind when they are making their notes and gathering their information.
- The teacher should set timelines and process indicators, as required.

Assessment:

- The teacher should be vigilant in providing on-going assessment and feedback as students work through their assignment.
- Assess the final products as evidence of the acquired knowledge and understanding of farming and agriculture in Canada today based on *The Real Dirt on Farming*.

Enrichment:

- Students create a display of their final products for a department promotion event or a professional development session for teachers.



Student Activity 7A: The Real Dirt on Farming “R-A-F-T” Assignment



Name: _____

Task: *The Real Dirt on Farming* begins with a letter from Canadian Farmers. Your overall task is to prepare a response to the information given by Canadian Farmers to demonstrate your understanding of farming and agriculture in Canada today. To do this, choose a role, an audience, a format and a topic. *The Real Dirt on Farming* will be your primary reference along with suggested websites indicated throughout the resource.

Instructions:

1. Choose options from each column in the “R-A-F-T” below. Be sure to consider your interests, learning preferences and strengths as you make your selections.
2. Review *The Real Dirt on Farming*. Use the Graphic Organizer (Student Activity 7B) to make some notes to help you with your final product. Be sure to keep your role and your audience in mind.
3. Check with your teacher for timelines and process indicators.

ROLE	AUDIENCE	FORMAT	TOPIC
TV or radio reporter	The public watching a streaming video, newscast, listening to a podcast or short series of podcasts The public	Video or podcast	Debunking the farming and agriculture myths in Canada today.
Newspaper or magazine feature writer	The public	Write a feature story. It may be written in first or third person.	How do my food choices rely on farming and agriculture in Canada?
Song writer/performer	High school assembly	A performance (e.g., musical, acting or storytelling)	What is really happening “down on the farm” in Canada today?
You! A Canadian teen!	Canadian Farmers	A letter	“My Top Ten!” Ten things I have learned about farming and agriculture in Canada today.

Student Activity 7B: : Graphic Organizer

Graphic Organizer for *The Real Dirt on Farming* “R-A-F-T” Assignment



SECTION	HIGHLIGHTS FROM THIS SECTION	IDEAS I MIGHT USE
Farming – The Big Picture		
Ensuring Safe Food Starts on the Farm		
Raising Farm Animals		
Let's Talk Crops		
So Much More Than Food Farmers – The Active Environmentalists		
The Role of Science in Producing Our Food		
In Closing		

Websites (Teacher/Student)

Agricultural universities and colleges in each province are reliable sources of information with a wealth of material. There are many websites where you can find more information about agriculture in Canada. Below is a list of website resources. Each national website has links to provincial and territorial websites.

- AGCare – www.agcare.org
- Agriculture and Agri-Food Canada – www.agr.gc.ca
- Agriculture in the Classroom – www.aitc.ca
- Alberta Farm Animal Care – www.afac.ab.ca
- Beef Information Centre - www.beefinfo.org
- Best Management Practices Program – www.omafra.gov.on.ca/english/environment/bmp_books.htm
- BioProducts Canada Inc – www.bio-productscanada.org
- Canadian Animal Health Institute – www.cahi-icsa.ca
- Canadian Environmental Sustainability Indicators 2008 – www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En
- Canadian Federation of Agriculture – www.cfa-fca.ca
- Canadian Food Inspection Agency – www.inspection.gc.ca
- Canadian Organic Growers – www.cog.ca
- Canadian Renewable Fuels Association (CRFA) – www.greenfuels.org
- Canadian Renewable Energy Network – www.canren.gc.ca
- Canadian Wind Energy Association – www.canwea.ca
- Chicken Farmers of Canada – www.chicken.ca
- Dairy Farmers of Canada – www.dairyfarmers.ca
- Egg Farmers of Canada – www.eggs.ca
- Environmental Canada, Environmental Technology Directorate – www.ec.gc.ca/etad
- Environmental Footprint: www.myfootprint.org/
- Farm Issues – www.farmissues.com
- Foreign Agriculture Resource Management Services – www.farmsontario.ca
- Grain Farmers of Ontario – www.gfo.ca
- Growing Canada – www.growingcanada.ca
- Grow our Farms – www.growourfarms.ca
- Growing Forward – Growing Canadian Agri-Innovations – www.agr.gc.ca/Agri-Innovations
- Health Canada – www.hc-sc.gc.ca
- Natural Resources Canada – www.nrcan.gc.ca
- Ontario Agri-Food Education Inc. – www.oafe.org
- Ontario Farm Animal Council – www.ofac.org
- Ontario Fruit and Vegetable Growers' Association – www.ofvga.org
- Protecting Crops from Pests – www.statcan.gc.ca/pub/96-328-m/2004011/4225114-eng.pdf
- Statistics Canada (Canadian Agriculture at a Glance) – www.statscan.gc.ca
- Turkey Farmers of Canada - www.turkeyfarmersofcanada.ca



Print Material (Teacher)

- Baker, J. (1991). *Window*. New York: Greenwillow Books, ISBN: 0-688-08917-8 (trade)
- Elton, S. (2010). *Locavore*. Toronto, Canada: Harper Collins Publishers Ltd., ISBN: 978-1-55468-418-2
- Hume, G. (2010). *The Local Food Revolution*. Canada: Municipal World Inc., ISBN: 091977995-6
- Ontario Agri-Food Education Inc. resources (available at www.oafe.org)
- Smith, A. & MacKinnon, J.B. (2007). *The 100-Mile Diet*. Canada: Random House of Canada Ltd., ISBN: 978-0-679-31482-0
- Webb, M. (2008). *Apples to Oysters: A Food Lovers Tour of Canadian Farms*. Viking Canada, ISBN: 978067006624

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