農学部海外実地研修報告書
『北米・カナダにおける持続的農業』
(2010年　8月22日～9月4日)

京都大学農学部

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１．はじめに

京都大学農学研究科長・学部長
遠藤隆

京都大学農学部ではカナダ国アルバータ大学農業・生命・環境学部（the Faculty of Agricultural, Life and Environmental Sciences (ALES), University of Alberta）との間で学部学生を交互に派遣し、受け入れるというプログラム（Field Training for Students: UA-AAFC Partnership Program）を策定しました。今年度、京都大学農学研究科は京大の学生をはじめて派遣し、研修プログラム「北米・カナダにおける持続的農業」を実施しましたので、その経緯を報告いたします。

今回のプログラムを開始する前に、京都大学農学部・研究科はアルバータ大学 ALES との間で部局間の学術交流協定と学生交流協定を 2009 年に結んでおります。この協定は、2006 年に農学研究科の客員教授として滞在していたアルバータ大学の Adjunct Professor である Charlie Arshad 氏からの提案がきっかけでした。当時、私は副研究科長として国際交流を担当しており Arshad 氏の大学院生に限る学生交流協定の提案を検討しました。Arshad 氏の数度の来日時における詳細な打合せと農学研究科国際交流委員会の承認を受けて、私は 2009 年 2 月にアルバータ大学を訪問し、学部長の Prof. John Kennelly（現在も学部長）に面談して協定の調停にこぎつけました。その後、農学研究科との協定は地球環境学堂を含めた協定に改定されました。私が農学研究科長になってから、Arshad 氏からカナダ政府機関から支援を受ける学部学生の交流プログラムの提案がありました【資料1】。提案の背景には、カナダでも大学生が海外に出ない傾向があり問題にされていることがあったようです。Arshad 氏が来日した機会に京都を訪問してもらいプログラムの詳細を決定し、また参加予定学生にプログラムの説明をお願いしました。このプログラムの実施の早い段階から地球環境学堂の渡邉哲弘助教に参画していただき、学生の募集ではお世話になりました。また、途中から、地球環境学堂の今西純一助教にも参加していただき、両先生には、事前研修やカナダへの同行などで大変お世話になりました。

今回の学部学生交流プログラムは、派遣と受入れを隔年、交互に行うもので、2 週間の受入れ派遣国内プログラムにかかる費用は受入れ大学が負担することにしました。初年度 2010 年は京大の学生を派遣（4~6 名）することで合意しました。学生が負担する費用として航空運賃とカナダでの宿泊費用で約 35 万円として募集を行いました。どのくらいの応募があるのか心配でしたが、最終的には 10 名（農学部 9 名、工学部 1 名）の学生の応募があり、アルバータ側に全員の受入れを了承してもらいました。最初のことでもありましたので、渡邉・今西先生と研究科長の私とで学生を連れていくことになりました。私は最初の一週間で帰国しました。

アルバータ大学では、Arshad 氏の他に若手教員が 3 名と車の運転手を兼ねた学生の助手が 2 名、そして、学部学生 7 名がプログラムに参加してくれました。アルバータの学生にとっては、このプログラムは単位になる科目で、2 週間の間ずっと京大の学生と行動を共にし、毎日レポートの提出が義務付けられていました【資料 2】。この学生(全員？)が 2011 年に京都に派遣されてきます。到着した日の夜は、大学近くのレストランで歓迎を兼ねた夕食に招待されました。プログラム初日に京大の学生諸君に日本や京都や京大についてパワーポイントによる紹介をしてもらいました。シャイとの悪評のある京大の学生がどの程度英語で発表できるのか不安がありましたが、結果は杞憂に終わりました。私だけでなく、京都に何度も来て学生の英語力を知っている Arshad 氏にとっても、学生諸君が物怖じせずしっかり発表していることは嬉しい誤算でした。その後の一週間は、アルバータ大学の寮に泊まって、毎日、講義と自動車 2 台に分乗して近郊の農場などの施設の見学に出かけました。第一週の終りに、ALES の学部長が、大学の教員クラブ施設で我々教員と学生を招待して歓迎会パーティーを開いてくれました。そのパーティーには国際交流部の関係者、支援政府機関の代表、それと、大学に数百ヘクタールの農地を寄付した家族も同席しており、盛大なものになりました。第二週は、学生と 2 名の教員はアルバータの学生たちと車で州内のいろいろな施設に見学に出掛けて行きました、私は一足早く帰国しましたが、Arshad 氏からは京大とアルバータ大学の学生諸君はよく交わり、大変有意義なプログラムになったとの報告を受けました。まさに「案ずるより産むが易い」でした。今回の研修の詳しい内容は、この報告書に記録されています。

今回の研修プログラムで予想していなかったことが二つ起こりました。一つは、カナダ滞在中の昼食と夕食(朝食は寮に付いていた)をアルバータ大学が全部負担したことです。事前の取決めでは京大の学生はカナダでの滞在費を負担することになっていたのですが、予算があったせいか、バラバラに食事をすると面倒だったのか、学生たちはほとんど食費を使わなかったことになります。もう一つは、総長裁量経費が認められ、学生の旅費のかなりの部分がその経費でカバーされたことです。学生(と保護者？)にとっては思わぬ朗報でありました。この紙面を借りて、松本紘京大総長に御礼を申し上げます。来年はカナダの学生がやってきます。カナダで受けた歓迎と研修プログラムに負けないように、現在、学生諸君と京都での研修プログラムを作成中ですので、ご期待ください。

２．研修の目的

Objective of the Field-based Training Course

The proposed activities (attached) fulfill the primary course objective of developing professional skills through field-based, hands-on learning about Alberta Agriculture. The activities have been chosen such that students are exposed to a broad cross section of Alberta's Agricultural sector from primary production (Aug. 27, 28, 30) to marketing (Aug. 24) to value-added food processing (Aug. 26). Emphasis will also be placed on agri-environmental initiatives such as bioenergy (Aug. 25, Sept. 1) and conservation practices (Aug. 25, 27, 28, 31). These activities will give the Kyoto University and the University of Alberta students an appreciation for the diversity of agricultural activities in Alberta and strengthen partnerships between the two universities.

Course Description:

Canadian and Japanese students will spend two weeks (23 August to 3 September, 2010) at select locations in Western Canada to learn about farm practices and their effects on rural environment, agricultural sustainability and market access. It will provide an opportunity for local and international students and future agricultural professionals to build mutual understanding as they study together and interact with producers, processors, innovators and regulators in Canadian prairie agriculture.

The field-based training program (FBTP) is a planned and supervised learning experience through first-hand observations and participatory responsibilities in agriculture, food and forest-related firm environments, which all share common issues around sustainability. The key objective is to provide students with the opportunity to study and participate in a dynamic and practical field-based training program. While specific activities during the two week field training program vary from one field placement site to another, all field training sites should enable students to participate in learning experiences that are not normally available in the classroom, but are essential for sound training in practical skills related to identifying and managing sustainability issues in agriculture, food and forest businesses.

All 2nd and 3rd year full-time undergraduate students in the faculty of ALES/Kyoto U are eligible to apply. Students must participate in all field training sites under the joint supervision of a faculty member. At the end of the FBTP, the student must submit a written field training report (max 10 pages; letter, 1.5 pacing), present a 45 minutes powerpoint summary of his/her experiences in front of an evaluation committee in English (for Canadian students) or in Japanese (for Japanese students).

【資料 2】

Manual for the UofA/ KU Field-based Training Program

(1.) **Purpose and objectives.** The field-based training program (FBTP) is a planned and supervised learning experience through first-hand observations and participatory responsibilities in agriculture-, food- and forest-related environments, which all share common issues around sustainability. The primary objective is to provide students with the opportunity to study and participate in a dynamic and practical field-based training program. While specific activities during the ten-day field training program vary from one field placement site to another, all field training should enable students to:

· participate in learning experiences that are not normally available in the classroom, but are essential for sound training in practical skills related to identifying and managing sustainability issues in agriculture, food and forest businesses

· test the validity and applicability of classroom learning to practice, thus helping students develop their own professional skills

· develop operational skills, gain experience, and enhance professional self-confidence as future managers, consultants or policy analysts

· make a service contribution during the course of training that will not only be useful to the firms that participate, but also will enhance the student's management and analytic skills and self-confidence

· Develop the beginnings of sound and mature professional attitudes

· Provide the chance to evaluate one's own personal and professional growth

· develop an agenda for subsequent experiential learning

· broaden the student's professional network base

(2.) **Requirements**: All full-time undergraduate students in the faculty of ALES are eligible for a ten-day Field-based Training Program, but only a few students will be selected. Students must participate in all ten days of field training under the joint supervision of a faculty member. At the end of each field day, students have to submit a one-page summary of their site-experiences. For each field day, a student theme leader will be identified. During the evening prior to each field day, students are expected to discuss the following day's theme (and material that will be made available at the outset of the training program) with the student theme leader. At the end of the FBTP, the students are evaluated based on three pieces of information: (a) the daily one-page summary of each site-experience [all summaries worth 20% of the total field trip grade], (b) students must submit a written field training report (max 10 pages; letter, 1.5 pacing; worth 45% of the total field trip grade), and (c) students have to present a 45 minutes powerpoint summary of his/her experiences in front of an evaluation committee (worth 35% of their total field trip grade; to be performed as a mixed Canadian-Japanese student group), and Furthermore, students are asked to provide an evaluation of the internship (see section (5.) of this manaual).

(3.) Implementation: Students selected to participate in the exchange will participate as hosts (to the Japanese students when they are in Alberta) and guests (when in Japan). In order to meet the professional development and networking objective, the selected ALES students, with the assistance of faculty members, will choose field sites and plan the trip itinerary.

(4.) Selection Criteria: Student selections will be based on academic achievement.

(5.) Assessment of the field training by student participants:

Considering the above objectives, to what extent do you perceive that they were met (please use the following scale in your answers):

1	2	3	4	5
Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

_____ 1. The **learning objectives** were met.

_____ 2. The answers the facilitators/ firm owners gave to participants' questions were **clear.**

_____ 3. The facilitators/ firm owners provided illustrative **examples.**

_____ 4. The exercises/ examples on training sites were **well facilitated.**

_____ 5. The exercises/ examples on training sites allowed participants to practice **practical skills** related to important concepts.

_____ 6. The exercises/ examples on training sites were effective ways for individuals to learn important **information.**

_____ 7. Participants were **actively engaged** in the exercises/ examples on training sites.

_____ 8. The exercises/ examples on training sites **overall** were effective.

A. Indicate the major instructional resource(s) used in this training program.

__ Print materials

__ Hands-on materials

__ Outdoor resources

__ Technology/audio-visual resources

__ Other instructional resources. (Please specify.)

_____

_____

B. Indicate the major way(s) in which participant activities were structured.

__ As a whole group

__ As small groups

__ As pairs

__ As individuals

C. Indicate the major activities of managers/ firm owners and participants in this program. (Check to indicate applicability.)

__ Formal presentations by managers/ firm owners /facilitator: **(describe focus)**

__ Formal presentations by participants: **(describe focus)**

__ Hands-on/investigative/research/field activities: **(describe)**

__ Problem-solving activities: **(describe)**

__ Reading/reflection/written communication: **(describe)**

__ Explored technology use: **(describe focus)**

1. What are the three most important **things [or topics]** you learned during this field-based training program?

2. Was an appropriate **amount of material** covered during this field-based training program? If not, was too *much* material covered or too *little*?

3. To what extent do you expect this training will make a **difference** in the way you do your future job(s)?

1	2	3	4	5
No Difference				Tremendous Difference

Comments:

Training Evaluation Form

For each statement, please check if you agree or disagree using a rating scale from “1” to “5”. A rating of “1” indicates that you strongly disagree with the statement and a rating of “5” indicates that you strongly agree and “3” is the level where you neither agree nor disagree.

Categories	Check your response				
Preparation	1	2	3	4	5
The goals for the field-based training program were stated clearly/ were clearly defined					
I was given enough information to prepare for the training					
Content Delivery					
The topics covered were relevant					
Each training site stated the objectives clearly					
There was sufficient opportunity for interactive participation					
The format allowed me to get to know the other participants					
The training was too technical and difficult to understand					
The training experience will be useful in my work					
I got most of my questions answered during the training					
The materials were pitched at the right level					
The materials for the training were helpful					
The schedule for the training provided sufficient time to cover all of the proposed activities					
The handouts provided were helpful					
Facilitator:					
The facilitators were knowledgeable about the topic					
The facilitators were well prepared for the session					
The facilitators encouraged active participation					
The facilitators answered questions in a complete and clear manner					
The facilitators were respectful of the different skills and values presented by the participants					
The facilitator modeled cross-sector collaboration					

General Satisfaction:					
The goals of the field-based training program have been met					
I am satisfied with my increased understanding of the topics					
This training is among the best practical trainings I have received on the topic of sustainability					
I was generally very satisfied with all aspects of this training event					
I plan to keep in contact with professionals I met at the training					
I plan to share the information I received during the training with other students					
The training provided me an opportunity to meet other students from different disciplines and backgrounds					
I was satisfied with the variety of training methods used					

What additional training would you like to have in the future?

Additional Comments:

THANK YOU!

３．研修スケジュール

研修の準備・実施の記録

1 月 7 日（木）　アルバータ大学担当者とメール連絡
参加者の人数、学年を決めるなど研修の準備を開始

4 月 5 日（月）　農学部ガイダンスでの研修の紹介
2～4 回生の各学科のガイダンスにてプリントを配布し、研修の紹介と参加者の募集【資料 3】

4 月 21 日（水）～30 日（金）　KULASIS による研修の紹介
農学部の 2～4 回生を対象に KULASIS（京都大学教務情報システム）のお知らせにてプリントを掲示、及び、研修の紹介と参加者の募集【資料 3】

4 月 30 日（金）　参加申し込み締め切り
12 名の参加申し込み

5 月 12 日（水）　会合（16：30～　農学部総合館 S-177）
参加者の顔合わせ、研修の内容、経緯などについて説明

6 月 3 日（木）　会合（16：30～　農学部総合館 W-302）
Alberta 大学 Arshad 教授より、研修についての講義、説明

7 月 7 日（木）　会合（17：00～　農学部総合館 S-177）
現地に行くまでの課題を提示、及び、航空券および海外旅行保険についての説明

7 月 7 日（木）　メール連絡
2 名が自己都合により参加をキャンセル

8 月 13 日（金）　会合（10：00～　農学部総合館 S-186）
課題の進捗状況の確認、及び、出発当日の集合場所、携行品、費用等について最終確認

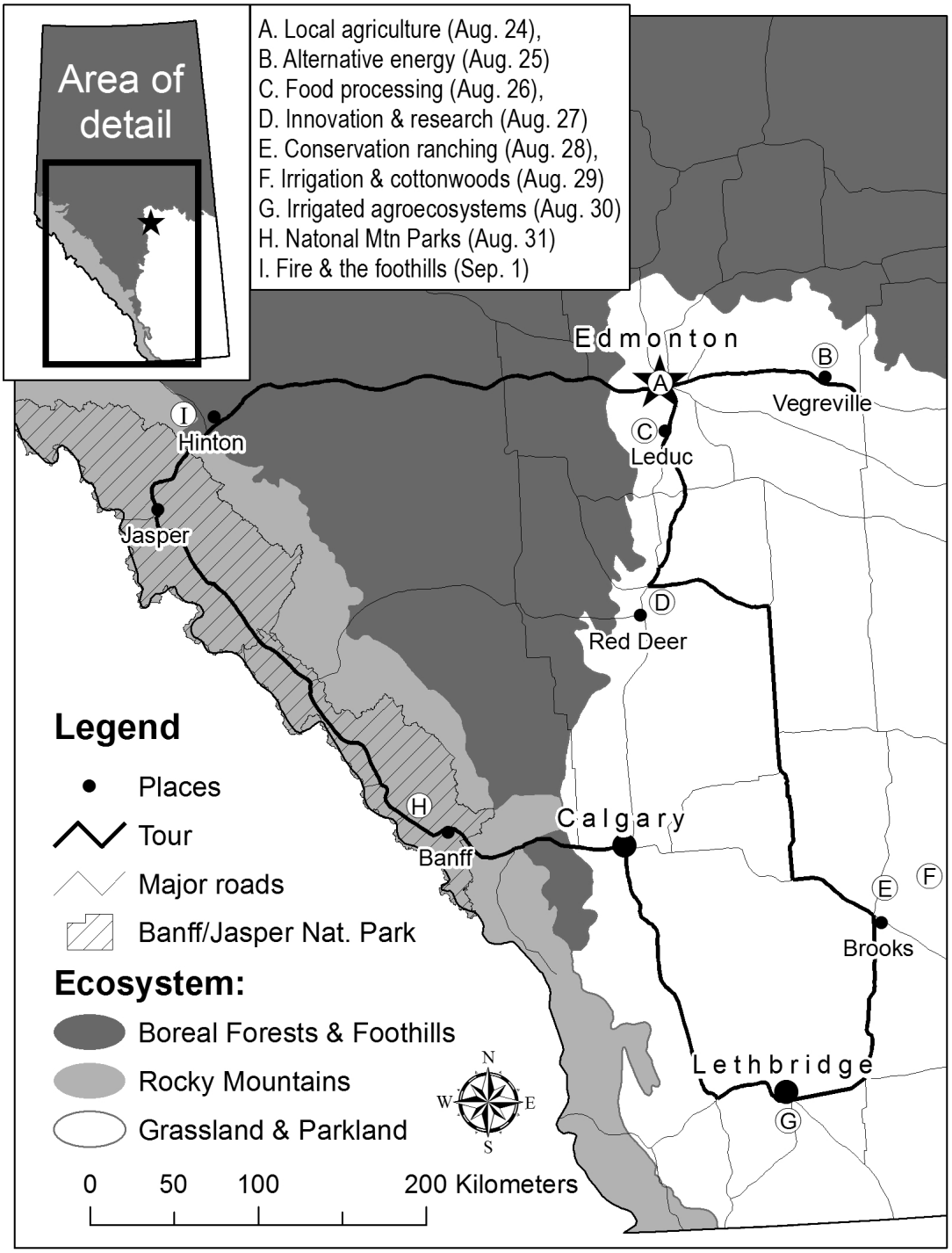
8 月 22 日（日）～9 月 5 日（日）　実地研修に出発
カナダ・アルバータ州にて実地研修

10 月 1 日（金）　会合（16：30～　農学部総合館 S-186）
報告書の作成についての相談

10 月 29 日（金）　会合（18：30～　農学部総合館 S-186）
報告書の作成を開始

Alberta-Kyoto Agricultural Tour, August 23 -September 3, 2010

Tour	Date	Day	Lecture/Activity	Instructor(s)	Tour location	Overnight
Welcome	Aug-23	Monday	Introduction	All	Edmonton & Devonian Botanical Gardens	Edmonton
A	Aug-24	Tuesday	Local agriculture & marketing (CSA's, etc.)	Charlie Arshad, Miles Dyck	Sunworks Farm	Edmonton
B	Aug-25	Wednesday	Alternative energy production	Miles Dyck	Vegreville Biogas Plant	Edmonton
C	Aug-26	Thursday	Food processing	Miles Dyck	Agrifood Discovery Place	Edmonton
D	Aug-27	Friday	Agriculture innovation & research	Miles Dyck, Craig Shaw	Alberta Agric. Crop Development Centre	Red Deer
E	Aug-28	Saturday	Conservation ranching	Scott Nielsen, Don Armitage	Duchess Ranch	Brooks
F	Aug-29	Sunday	Cottonwood regeneration challenges due to irrigation	Miles Dyck	Dinosaur Provincial Park	Lethbridge
G	Aug-30	Monday	Irrigated agroecosystems	Chokri Dridi	Lethbridge	Canmore (near Banff)
H	Aug-31	Tuesday	National Park tour	Scott Nielsen	Banff/Jasper	Hinton
I	01-Sep	Wednesday	Fire & the foothills	Scott Nielsen	Hinton (Athabasca lookout tower)	Edmonton
Wrap-up	02-Sep	Thursday	Reflection, summary & presentations	All	Edmonton	Edmonton
Extra day	03-Sep	Friday	Optional livestock auction	All welcome to attend	Westlock	Edmonton


Area of detail
A. Local agriculture (Aug. 24),
B. Alternative energy (Aug. 25)
C. Food processing (Aug. 26),
D. Innovation & research (Aug. 27)
E. Conservation ranching (Aug. 28),
F. Irrigation & cottonwoods (Aug. 29)
G. Irrigated agroecosystems (Aug. 30)
H. Natonal Mtn Parks (Aug. 31)
I. Fire & the foothills (Sep. 1)
Edmonton
A
B
Vegreville
C
Leduc
I
Hinton
Jasper
D
Red Deer
Legend
Places
Tour
Major roads
Banff/Jasper Nat. Park
Ecosystem:
Boreal Forests & Foothills
Rocky Mountains
Grassland & Parkland
H
Banff
Calgary
E
F
Brooks
Lethbridge
G
N
W
E
S
0
50
100
200 Kilometers

Tour descriptions

Welcome to the University of Alberta & a tour of the Devonian Botanical Gardens (Aug. 23)
A day for becoming acquainted with each other and your surroundings. The University of Alberta was founded in 1908 and currently has a student population of about 36,000 during the academic year (September to April). The Faculty of Agriculture, Life and Environmental Sciences offers bachelorette degrees in Agriculture (majors of Agricultural and Resource Economics, Animal Science, Crop Science, Range and Pasture Management and Sustainable Agricultural Systems), Animal Health, Business Management, Environmental and Conservation Sciences (majors of Conservation Biology, Land Reclamation, Human Dimensions, and Environmental and Economic Policy), Forestry, Human Ecology (majors of Family Ecology and Textiles and Clothing), and Nutrition and Food Science.

The University of Alberta Devonian Botanical Garden is managed through the faculty of Agriculture, Life and Environmental Sciences. It was established in 1959 and consists of 190 acres (77 hectares) of gardens, mixed woodland and an extensive nature trail system, including a Japanese Garden, butterfly and cactus showhouses and more.

The University is situated on the banks of the North Saskatchewan River. The headwaters of this river are in the Columbia Ice Fields of the Rocky Mountains (which you will visit on August 31).

A. Local agriculture & marketing (Aug. 24, Sunworks Farm, Instructors: Dyck & Nielsen)
A major challenge in sustainable food production is the production and marketing of local products. For this tour we will be visiting a local and highly successful organic farm, Sunworks Farm near Armena, Alberta. Sunworks Farm focuses on local production and marketing of pasture-raised organic chicken, beef, eggs, turkey, bison, lamb, and pork. Sunworks Farm markets their products at farmers markets in both Edmonton and Calgary.

Required readings:
Connell, D. J., J. Smithers, and A. Joseph. Farmers' markets and the "good food" value chain: a preliminary study. Local Environment, 13:169-185.

Relevant websites:
Sunworks Farm: http://www.sunworksfarm.com/

B. Alternative energy production (Aug. 25, Vegreville Biomass Plant, Instructor: Dyck)
High density feedlot operations are often the target of criticism by environmental groups because of the concentration of animal waste on a relatively small piece of land. This need not be the case, however, as we will see when we tour the Highland Feeders feedlot in Vegreville, Alberta. Here, methane generated from cow dung is used to power a digester that produces biogas which is used to generate electricity for the feedlot and surrounding area.

A term introduced in the "From Cow Dung to Clean Energy" article is "carbon footprint" which is the total amount of carbon dioxide equivalents produced from an industrial operation or process. Methane produced by the digestive system of cattle is about 30 times more potent as a greenhouse gas than carbon dioxide. By combusting the methane to power the biogas digester, the feedlot is significantly

reducing its methane emissions (albeit in exchange for carbon dioxide emissions). By producing biogas and using that to generate electricity, they are reducing their carbon footprint by not using fossil carbon-based electricity (coal or natural gas). The standard method of quantifying the carbon footprint is through Life Cycle Assessment (LCA).

Required readings:
EPA. 2006. Chapter 1: Life Cycle Assessment. In, Life Cycle Assessment: Principles and Practice. pp. 1-6.
http://www.ualberta.ca/SIGNATURE/cleanenergy.html
http://en.wikipedia.org/wiki/Biogas

C. Food processing (Aug. 26, Agrifood Discovery, Instructor: Dyck)
The Agri-Food Discovery Place located on the South Campus of the University of Alberta is a focal point for Industrial-University collaborations in the development of new food and agri-food industrial products and safe food processing. The facility is comprised of two facilities: 1) crops utilization; and 2) meat safety.

In the crops facility, research focuses on pilot-scale processes of prototype agri-food and agri-industrial products. Research also focuses on developing novel and innovative methods for the production of these products. Research in the meat safety focuses on the development of new processes to control pathogens during meat processing, packaging and storage.

The activities at the Agri-Food Discovery Place concentrate on adding value to raw agricultural commodities (plant and animal biomass). The joint public-private activities carried out at this facility contribute to diversity in the agricultural sector and economic development.

Required readings:
http://www.afdp.ualberta.ca/en/AboutUs.aspx
http://www.ctv.ca/CTVNews/EdmontonHome/20080823/recall_listeria_080823/
http://www.agmrc.org/business_development/getting_prepared/valueadded_agriculture/articles/index.cfm#

D. Community Supported Agriculture (August 26, Tipi Farms, Edmonton, AB)
Community Supported or Shared Farming is a growing phenomenon in Canadian Agriculture. Shared farming is an alternative to conventional food marketing which creates a partnership between farmer and the people who use the farm's produce. The consumer purchases a share in the spring time. This entitles them to receive fresh-picked, naturally-grown, seasonal produce, delivered to an in-town location weekly, during the growing season. Both farmer and consumer share the risks associated with agriculture (crop failure), but also share the benefits of success. Consumers also have the opportunity to participate in farm activities and community gatherings.

Required readings:
http://www.tipicreek.ca/our_farm.html
Canadian Institute for Environmental Law and Policy. 2008. Discussion Paper: Local food systems and urban-rural linkages.

E. Alley Kat Brewery (August 26, Edmonton, AB)
A microbrewery is a brewery which produces a limited amount of beer. The term and trend originated in the UK to describe emerging, small breweries which produced traditional cask ale. Currently, the

term reflects an alternative attitude and approach to brewing in contract to mass-market breweries. Microbreweries focus on creating quality and diverse products. The Alley Kat brewery in Edmonton uses malt barley grown in Alberta, cleaned and processes at the Rahr Malthouse in Alix, AB, located about 1.5 hours southwest of Edmonton. This brewery is another example of adding value to agricultural produce and local food production.

Required readings:
http://www.alleykatbeer.com/
http://www.rahr.com/index.geni?mode=content&id=178
http://en.wikipedia.org/wiki/Microbrewery

F. Innovation & research (Aug. 27, Agriculture Crop Development Centre, Instructors: Dyck)
Publically-funded research into crop and animal production is important to sustainable agriculture in Canada. The Agriculture and Agri-Food Canada and Alberta Agriculture research centers in Lacombe, Alberta are focal points for agronomy (cropping systems and management), animal production and processes, and crop breeding research. The results and products of the research carried out at these facilities are made available to farmers to implement at a larger scale.

Required readings:
McCallum, B. D., and R. M. Depauw. 2008. A review of wheat cultivars grown in the Canadian prairies. Canadian Journal of Plant Science. 88:649-677.

G. Whelp Creek Watershed (Aug. 27, Near Lacombe, AB)
The Lacombe area is one of the most intensively managed agricultural areas in Alberta. As you saw at the Lacombe research centres, wheat, canola, barley, pork and beef are produced in this area. With agricultural land being used to dispose of animal manures, and high fertilizer requirements for crop production, nutrients (nitrogen and phosphorous) and pathogens sometimes end up in surface water bodies either through surface runoff or subsurface flow. These nutrients significantly reduce water quality. Research is being carried out to evaluate the influence of various management practices on the fate of agricultural nutrients. These so-called Beneficial Management Practices (BMPs) are hoped to reduce the amount of pathogens and nutrients that end up surface water bodies. The Whelp Creek watershed near Lacombe, is the site of extensive research and evaluation of BMPs.

Required readings:
Alberta Agriculture. 2007. Executive Summary. Nutrient Beneficial Management Pracitices Evaluation Project: 2007 – 2011.

H. Conservation Ranching (Aug. 28, Mattheis Ranch, Instructor: Nielsen)
A major challenge in agriculture is balancing food production with environmental stewardship and sustainability. For livestock production, it has been argued by many that the continued reliance of annual grains, which are supplemented with petroleum-based fertilizers and grown using annual tillage and/or GMO-biocide-reliant approaches, is unsustainable both ecologically and economically. The argument goes that we have unnecessarily complicated the age-old and simple task of raising meat, milk, eggs, and animal fibres by introducing annual grain monocultures that are dependent on expensive machinery and transportation, as well as the use of confinement systems which externalize nearly all of their inputs. In contrast, pasture-based farming methods, particularly the Voisin or high-intensity rotation grazing approaches, replicate nature's model by basing the system around a perennial polyculture structure, the active trophic integration of plant, herbivore, and predator (with humans as

the substitute carnivore), and the facilitation of natural animal behaviours including rotational grazing/migrations where the animal does the harvest and fertilization for no cost.

For this tour we will explore the Mattheis Ranch near Duchess, Alberta and speak with the ranch manager Don Armitage about pasture-based farming in one of the driest places of Canada and how this ranch has managed to balance both livestock production with the conservation of open spaces and the native flora and fauna of the western grassland ecosystem of southern Alberta.

Required Reading:
Jensen, M.N. 2000. Can cows and conservation mix? BioScience, 51, 85-90.

I. Irrigation & cottonwood regeneration (Aug. 29, Dinosaur Provincial Park, Instructor: Dyck)
Surface water reservoirs have been constructed in the South Saskatchewan River Basin to provide water for irrigation in the Calgary, Brooks, and Lethbridge areas of Alberta. One unintended consequence of the construction of these reservoirs is the disruption of natural flow variability in the river. Cottonwood trees rely on the saturated conditions created by spring floods for their seeds to germinate. The diversion of spring runoff into irrigation reservoirs has disrupted the reproduction cycle of riparian vegetation.

Required readings:
Cordes, L. D., F. M. R. Hughes and M. Getty. 1997. Factors affecting the regeneration of distribution of riparian woodlands along a northern prairie river: the Red Deer River, Alberta, Canada. Journal of Biogeography, 24:675-695.

Rood, S. B., K. Taboulchanas, C. E. Bradley, A. R. Kalischuk. 1999. Influence of flow regulation on channel dynamics and riparian cottonwoods along the Bow Rivers, Alberta. Rivers, 1:33-48.

J. Irrigated agriculture (Aug. 30, St. Mary River Irrigation District, Lethbridge Research Centre, and Cargill Animal Nutrition, Lethbridge, Alberta, Instructor: Dridi)
We will start the day with a presentation and tour of the St. Mary River Irrigation District (SMRID), the largest irrigation district in Canada. SMRID covers a significant area between the cities of Lethbridge and Medicine Hat; however, in our tour we will focus on a visit of the facilities and installations located in Lethbridge, where the head-office of the SMRID is located. In the afternoon, we will visit the Lethbridge Research Centre (LRC); in this segment we will look into crop water management, water conservation, irrigation systems, and sustainable practices. LRC conducts research in irrigation methods and practices that aim at increasing productivity and the sustainable use of water resources. Many food processors in Alberta are located in the southern part of the province where they have access to producers. So, before leaving Lethbridge to Canmore, we will look into the animal feed processing industry through a tour of Cargill Animal Nutrition facilities, where the focus is on customized feed for a wide array of animal production.

Required readings:
Irrigation in Alberta: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/irr7197 (PDF handout)
Sites information (SMRID, LRC, Cargill Animal Nutrition) (PDF handout)

Relevant websites:
St. Mary River Irrigation District: http://www.smrid.ab.ca/

Lethbridge Research Centre: http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1180547946064&lang=eng, http://www.demofarm.ca/
Cargill Animal Nutrition: http://www.cargillanimalnutrition.com/

K. National Park Tour (Aug. 31, Banff and Jasper National Park, Instructor: Nielsen)
We will spend the day touring Banff and Jasper National Parks located in the heart of the Canadian Rocky Mountains with stops in Lake Louise and the Columbia Icefields. We begin the day driving through the lower elevation montane habitats along the Trans Canada Highway in Banff National Park (notice the wildlife overpasses) and arriving at Lake Louise for a viewing of the surrounding mountains and lake. Next, we will arrive at the Columbia Icefields for lunch with time to enjoy the interpretative centre and a short hike along the recessional moraines of the Athabasca Glacier onto the toe of the active glacier. Finally, we will leave the Columbia Icefields for Hinton enjoying a BBQ dinner with other University students at the Cache Percotte Spring Camp Cabins.

Relevant websites:
Banff National Park: http://www.pc.gc.ca/pn-np/ab/banff/index.aspx
Jasper National Park: http://www.pc.gc.ca/eng/pn-np/ab/jasper/index.aspx

L. Fire in the Foothills (Sept. 1, Athabasca Lookout Tower, Instructor: Nielsen)
The foothills of the Rocky Mountains in Alberta are dominated by lodgepole pine, a species adapted-to and dependent-on fire for their long-term persistence. Over the past 100 years this region has gone from a highly disturbed ecosystem with fires common in the 1910s to a highly managed landscape with large fires rare and forest harvesting common. This forest management success has no doubt been due largely to the network of fire lookout towers within the foothills and modern forest fighting techniques. Today the foothills of Alberta are shaped not so much by fire but instead by anthropogenic disturbances associated with forestry, mining, and natural gas exploration and development. As a consequence of this landscape change, a number of sensitive wildlife species, such as grizzly bears and caribou (reindeer), are in decline and now threatened. To gain a better view of the landscape and to learn firsthand fire spotting methods that have re-shaped this ecosystem, we will climb the Athabasca fire lookout tower near Hinton and get a tour of the tower and equipment used to spot wild fires by the resident forest ranger.

Optional reading:
Rhemtulla, J.M., R.J. Hall, E.S. Higgs, S.E. MacDonald. 2002. Eighty years of change: vegetation in the montane ecoregion of Jasper National Park, Alberta, Canada. *Canadian Journal of Forest Research*, 32, 2010-2021.

Final wrap-up (Sept. 2, Reflection, summary & presentations)
A day to reflect on and synthesize your experiences. Groups composes of UofA and Kyoto-U students will work together on the final assignment.

Extra day (Sept. 3, Westlock livestock auction)
For interested students, come see the excitement of an Auction at Triple J Livestock Auctions. Triple J Livestock has been in buseness for over 50 years. Cattle auctions are a major livestock marketing tool by which local producers can sell their livestock to feedlots or other food processing companies.

The day is also free for other activities.

4．研修参加者名簿

京都大学 農学部

氏 名	所属	学年 / 役職	性別
学生			
三谷 太郎	食料･環境経済学科	4	男
池田 千紘	森林科学科	3	女
椹木 裕里	食品生物科学科	3	女
藤盛 瑶子	資源生物科学科	3	女
伊原 嶺	資源生物科学科	2	男
栗田 一平	地域環境工学科	2	男
小谷 麻菜美	資源生物科学科	1	女
伊達 慶明	応用生命科学科	1	男
盤若 明日香	森林科学科	1	女
樋口 裕磨	工学部 地球工学科	1	男
教員			
遠藤 隆	資源生物科学科 植物遺伝学	教授	男
今西 純一	森林科学科 環境デザイン学	助教	男
渡邉 哲弘	資源生物科学科 土壌学	助教	男

Faculty of Agricultural, Life and Environmental Sciences, University of Alberta

氏 名	所属	学年 / 役職	性別
学生			
Caroline Carter	Rural Economy	4	女
Rachelle Rimmer	Environmental Conservation	4	女
Brett Campbell	Environmental Conservation	3	女
Chase McGowan	Animal Science	3	男
Darren Haarsma	Rural Economy	3	男
Heather Nelson	Environmental Conservation	3	女
Ryan Schoorlemmer	Crop Science	3	男
教員			
Dr. M Charlie Arshad	Soil Science, Faculty Coordinator	Adjunct Professor	男
Dr. Miles Dyck	Environmentally Sustainable Agriculture	Assistant Professor	男
Dr. Scott Nielsen	Conservation Biology	Assistant Professor	男
Dr. Chokri Dridi	Environmental & Resource Economics	Assistant Professor	男