‘Farm to Fork’
Linking Teaching to Research
A Teaching Resource
Dr Jennie Litten-Brown
Dr Colin Litten-Brown

Contact:  j.c.litten-brown@reading.ac.uk

Sponsored by
Progress South Central
Lifelong Learning Network
www.progresssouthcentral.org.uk

The University of Reading
www.reading.ac.uk
This document has been prepared where possible using guidelines provided by the British Dyslexia Association.

The purpose of this presentation is to demonstrate the link between research and teaching in a university environment using a land-based case study.
Teaching Aims
Teaching Aims

• To illustrate by way of a land-based case study the link between research and teaching in a university environment.

• The case study will follow the production of meat through all stages of farming and illustrate both the taught modules at the University of Reading and some key research that links with every stage.
How does teaching differ between school and university?
School Teaching

• In school, subjects are taught according to a national curriculum or other fixed framework.

• While this changes year on year, it means that across the country, pupils are taught the same information for a given subject.
University Teaching

University courses are much different:

- For each given subject a student will take many smaller modules which can be selected from a wide range of relevant subjects depending on the student’s interests.

- The modules reflect the expertise and research being undertaken at that particular institution and will differ between universities offering the same subject.
So where does research come into it?
University Research

• Most university departments undertake research.

• The purpose of research is to increase mankind’s knowledge on a subject and to develop new ways of doing things.

• As new discoveries are made, they quickly become integrated into taught modules so that the courses offered provide the most up-to-date theories possible.
Case Study

- The link between the teaching and research activities of a typical university can be illustrated by means of the following case study.

- We shall use typical current teaching modules and examples of research from the Department of Agriculture, Policy and Development at the University of Reading (as of November 2010).
In this case study, we shall examine the pathway from ‘Farm to Fork’ i.e. the route by which a typical piece of meat arrives on your dinner plate.
**Stages**

For the purpose of this case study we will assume that the following key stages are involved in getting the food to your plate:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Stage</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil &amp; Land Management</td>
<td>4</td>
<td>Livestock Nutrition &amp; Production</td>
</tr>
<tr>
<td>2</td>
<td>Crop &amp; Feed Management</td>
<td>5</td>
<td>Farm Management</td>
</tr>
<tr>
<td>3</td>
<td>Livestock Selection &amp; Development</td>
<td>6</td>
<td>Selling &amp; Consumption</td>
</tr>
</tbody>
</table>
## Degree Courses

Modules in this case study are taken from the following degree courses:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Degree course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agric</td>
<td>Agriculture</td>
</tr>
<tr>
<td>ABM</td>
<td>Agricultural Business Management</td>
</tr>
<tr>
<td>AS</td>
<td>Animal Science</td>
</tr>
<tr>
<td>CBM</td>
<td>Consumer Behaviour and Marketing</td>
</tr>
<tr>
<td>ECM</td>
<td>Environment and Countryside Management</td>
</tr>
<tr>
<td>FMB</td>
<td>Food Marketing and Business Economics</td>
</tr>
</tbody>
</table>
Stage 1

- Soil and Land Management.

- On any farm it is important to ensure the ground is optimum for any agricultural need. Ground with different soils are used for different purposes e.g. arable, grazing etc. and by rotating crops and grazing herds, land can be managed efficiently.
Teaching

• The initial stage of any livestock production is the management of the grazing land and the land that is used to grow feeds.

• At Reading, there are several teaching modules that fit within this broad area as well as the general ones which will be discussed later.
Modules

- **Agricultural Mechanisation:**
  Provides basic knowledge of the construction, operation and use of agricultural machinery.

- **Soil Use & Management:**
  Introduces soil as a medium for plant growth and agricultural production, providing an understanding of soil components and processes and the importance of these in good soil management.
Modules

• Sustainable Land Management:
  Explores the importance of sustainable land management for the earth and future generations using examples of unsustainable practices to explore the problems associated with them.
Research

• The university has a number of research projects looking at land use and management in an environment with increasing global population and pressure on agriculture to produce more food.

• Much of the research focuses on land use and biodiversity.
Research

The inter-relationships between agricultural land-use and biodiversity.

Research concentrates on agro-ecosystems including agricultural habitats themselves, as well as natural and semi-natural habitats affected by agricultural land-use. Research interests are global, ranging from intensively managed production systems typical of NW Europe to tropical agriculture and its associated ecosystems. A major emphasis of the work is to understand the mechanisms linking agricultural land-use and biodiversity, and use this understanding to conserve biodiversity and its associated services more effectively in agricultural landscapes. Project work is partly focused on very specific agri-environmental issues, while also addressing more general ecological principles that are crucial to understand how biodiversity responds to land-use change driven by agriculture.
Crop Protection Research Group

Nematodes are a major constraint to crop production in many countries and the group is actively assessing non-chemical methods of control.
Crop and Feed Management.

Once the soil and land have been prepared, it is important that any feed crops are managed correctly and that the feeding regimes of beef cattle are designed for optimum production.
Teaching

- The taught modules across the degree courses available at Reading integrate understanding of animal production from a variety of areas.

- With access to the university farms and other study trips, crop and animal production are covered in depth.
Modules

- **Introduction to Crop Production:**
  Reviews the factors influencing crop choice and cropping systems covering principles and practice of crop production and crop biology.

- **Animal Production:**
  Provides an understanding of the management and feeding regimes of different systems with lectures complemented by study visits.
Research

The University of Reading undertakes significant amount of research in the area of crop production, looking at new strains of plants to increase yield as well as grow in more diverse areas while also looking at methods of protecting crops from disease and environmental conditions.
There are a number of groups looking at crop science research, such as:

- **Plant Environment Laboratory**
  The PEL comprises a unique collection of controlled-environment facilities which enable the effects and interactions of several environmental factors on crop growth and development to be investigated.

- **Crops Research Unit**
  Provides the facilities for field crops research and experimentation by students and staff
Research

– **Seed Science Laboratory**
  It is concerned with three main topics:
  • seed storage and associated problems, especially those of long-term storage as in genebanks,
  • physiological quality of seeds (seed vigour) and its effects on crop establishment, growth and yield, and
  • seed dormancy, factors affecting its release and their implications for weed control.

– **Crop Protection Research Group**
  Nematodes are a major constraint to crop production in many countries and the group is actively assessing non-chemical methods of control.
Stage 3

- Livestock Selection & Development.
- An understanding of the health and development of livestock is important when it comes to selecting the best breeds and management practices for meat production.
Teaching

• The available modules at Reading cover all aspects of animal development including reproduction, health, disease and growth.

• The effect of environmental conditions on the development of livestock is also important and covered in depth.
Modules

• **Introduction to Livestock Systems:**
  Examines species of domestic animals and their diversity and their adaptations to diet, intensive and extensive systems of production and the future of livestock in world food production.

• **Animal Health and Disease:**
  Looks at the disease challenges faced by farm & companion animals and how they can be prevented and controlled, as well as how the animal responds to the challenges.
• Animal Growth, Lactation & Reproduction:

Provides an understanding of the physiological, nutritional and hormonal basis for growth and development of animals and a sound understanding of the underlying biology and importance of lactation and the means by which these processes can be manipulated.
Research

Much of the research at Reading focuses on the health and production of livestock and the link between health and production.
Research

- Animal Science Research Group
  The Group contains a wide range of expertise including nutrition, food composition and health, digestive physiology and metabolism of food producing animals together with the environmental impact associated with the food production. Simulation of digestive processes in vitro, secondary plant metabolites, biotechnology applications, bio-mathematical modelling and molecular aspects of the feed/animal interface.
The Veterinary Epidemiology and Economics Research Unit is an innovative, flexible and multi-disciplinary team that currently specialises in the following areas of livestock production and health:

- veterinary epidemiology, economics and surveillance;
- policy research and capacity building for animal health delivery through public and private veterinary services;
- animal health and welfare in farming systems and
- animal health and production software development.
Livestock Nutrition and Production.

The understanding of nutrition and the importance of it to the overall meat production and quality of livestock is essential.
Teaching

• At Reading there is a strong focus on digestion and nutrition with respect to a wide variety of animals within the taught modules.

• These modules focus both on the biological processes within the animal and also the impact nutrition has on the quality of food products produced.
Modules

- **Digestion and Nutrition:**
  Covers the nutrient components of foods, the biology of the digestion systems of animals and the digestive processes occurring in the gut.

- **Applied Animal Nutrition:**
  Looks at the requirements of animals for energy, protein, minerals and vitamins and the relationship between animal nutrition and human nutrition.
Animal Science Research Group

Much of the ongoing research looks at such factors as:

• **Animal-derived food products:** the positive and negative effects of the contents of animal foods on human health.

• **Human nutrition:** Whether the nutritional intake of animals can alter the composition of animal-derived food for beneficial effects on humans.

• **Environmental Nutrition:** Researching dietary strategies to reduce the emissions (e.g. methane) produced by some farm animals.
Stage 5

- Farm Management.
- The management of the farm is important both from the perspective of the farm itself but also its dealings with customers as it produces food to go out into the human food chain.
Teaching

• As well as the science behind the soil, the crops and the animals, a farmer needs to have a good grounding in business to understand the best production methods to sell his produce.

• Farmers need to interact with processors and retailers to get the food from the farm to the consumer.
Modules

- **Introduction to Management:**
  Introduces the science of management in a farming context.

- **The UK Food Chain:**
  Looks the main elements of the food chain and the interdependences between them from the point of view of producers, processors and retailers.
Research

Some of the major research areas include:

- The behaviour and motives of agricultural and rural land managers.
- Management of agricultural and rural resources.
- Food, agricultural and trade policy.
Research

- **Economics Research Group**
  
  Significant work in the ERG looks at attitudes towards animal welfare in farming and the adoption of new technologies and overall agricultural policy.

- Research is being undertaken looking at the science of scale in terms of farming and how policy reforms and socio-economic factors impact farming at different levels of size.
Stage 6

- Selling & Consumption.
- The production and consumption of food will be governed by many things but important will be the cost of the food and consumer behaviour.
Teaching

- As well as good management skills, the teaching at Reading focuses on the economics of farming and food production.

- Consumer behaviour and habits are also key to the production of food and the factors that influence the decisions made by consumers will impact on farm production.
Modules

- **Economics / Economics Aspects of the Food Supply Chain:**
  There are several modules that look at the basic theory of economics and also relate it back to the food chain.

- **Consumer Behaviour:**
  Looks at the psychology, sociology and economic factors influencing consumer purchase behaviour.
Research

Some of the major research areas include:

- Marketing and consumer behaviour
- Economic modelling

- Economics Research Group
  The research here looks at all aspects of the economics and consumer attitudes towards food production, such as:
  - Attitudes towards genetically modified produce
  - Consumer trust in food safety
  - Economics of animal health and welfare.
General Teaching

As well as the specialised modules, the degree courses also offer general modules that cover wider areas, allowing students not specialising in a particular area to gain at least a basic understanding of the subject in a holistic way.
General Teaching

- **British Agriculture in Practice:**
  - Develops understanding of production systems and how agriculture fits into the rural economy.
  - Involves a series of farm visits to put teaching into a practical context.

- **Introduction to Agricultural and Food Systems:**
  An introduction into the physical, social economic, and political environment facing farmers today.
General Research

It is often the case that research groups collaborate with cross-functional teams from different subject areas on larger ‘research themes’.

An example of this would be the Food Chain and Health theme coordinating efforts between:

- Agriculture, animal and plant sciences
- Economics,
- Food policy, food science, nutrition and consumer choice
- Bioscience
General Research

- Chronic diseases in humans including heart disease, Type II diabetes, many cancers, acute and chronic gut disorders and some dementias are a major growing societal and financial concern.

- It is feasible to identify particular food ingredients that may exert beneficial properties and the research is designed to investigate thus by underpinning the research with mechanisms of effect.
## Teaching

<table>
<thead>
<tr>
<th>Stage</th>
<th>Example Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil use and management (Agric) Sustainable land management (ECM)</td>
</tr>
<tr>
<td>2</td>
<td>Animal production (Agric) Introduction to crop production (Agric)</td>
</tr>
<tr>
<td>3</td>
<td>Introduction to livestock systems (Agric) Animal health and disease (AS) Animal growth, lactation &amp; reproduction (AS)</td>
</tr>
<tr>
<td>4</td>
<td>Digestion &amp; nutrition (Agric) Applied animal nutrition (AS)</td>
</tr>
<tr>
<td>5</td>
<td>UK food chain (FMB) Introduction to Management (Agric)</td>
</tr>
<tr>
<td>6</td>
<td>Economics (ABM) Consumer behaviour (CBM)</td>
</tr>
<tr>
<td>All</td>
<td>Introduction to agriculture &amp; food systems (Agric) British agriculture in practice (Agric)</td>
</tr>
</tbody>
</table>

## Research

<table>
<thead>
<tr>
<th>Stage</th>
<th>Research Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Centre for Agri-Environmental Research, Crops Protection Research Group</td>
</tr>
<tr>
<td>2</td>
<td>Plant Environment Laboratory, Crops Research Unit, Seed Science Laboratory, Crops Protection Research Group</td>
</tr>
<tr>
<td>3</td>
<td>Animal Science Research Group VEERU</td>
</tr>
<tr>
<td>4</td>
<td>Animal Science Research Group</td>
</tr>
<tr>
<td>5</td>
<td>Centre for Agri-Environmental Research, Economics Research Group</td>
</tr>
<tr>
<td>6</td>
<td>Economics Research Group</td>
</tr>
<tr>
<td>All</td>
<td>Food Chain and Health Research Theme</td>
</tr>
</tbody>
</table>