

# Teaching and Learning Program

**Year: Preliminary 2000**

**Course: Agriculture Stage 6**

## **Rationale:**

Agriculture provides opportunities for students at Agricultural High to extend their knowledge skills and appreciation for the land and the plants and animals it supports. The course is relevant to the needs of students in a rural community. It provides a basis for students to seek employment or pursue further studies in Agriculture.

## **School situation:**

Agricultural High School is a small rural high school in north-west NSW with a declining school population of 400 students. A small percentage of students are of Aboriginal origin. Agricultural lies on the perimeter of the Liverpool Plains – a fertile and productive agricultural region where cropping dominates the flatter country while cattle and sheep graze the slopes. Students are from families who own small family farms, work on farms or in agricultural service industries.

The school has a teaching staff of 39 , with 1 –2 Agriculture teachers, depending on enrolments, supported by a farm assistant employed fro 22 hours per week.

## **Resources:**

The 8 hectare school farm provides an outstanding resource for both teaching and learning with areas for growing fruit and vegetable crops and pastures for the school's Murray Grey stud cattle and their sheep. Other animal enterprises include a small piggery and layer and broiler hens. Students use this facility to develop skills and knowledge relevant to many aspects of their agricultural studies.

The positive community/ school interaction enables students to experience a wide range of activities beyond the classroom, including farm and agribusiness visits, sheep and pig judging competitions, cattle preparation and showing and Landcare activities.

## **Synopsis:**

The preliminary course incorporates the study of agricultural production, marketing and management, while giving consideration to the issues of sustainability of the farming system. This is an 'on-farm', environment- orientated course.

## Table of units:

1. Overview
2. The Farm Case Study
3. Plant Production
4. Animal Production

## Internal School Based Preliminary Course Assessment Schedule

No:	Task name:	Type	Value	Timing
1	Farm Study Report	Field work report	20%	End Term 1
2	Half Yearly Exam	Examination	20%	Early Term 2
3	Chicken Trial	Sample Collection and Research	20%	End Term 2
4	Field trial - Effect of fertilisers on plant growth.	Field work and practical report	20%	Early Term 3
5	Preliminary Yearly Exam	Examination	20%	End Term 3

**Title: Overview**

**Timing: 4 weeks**

**Outcomes:**

A student:

P1.1 describes the complex, dynamic and interactive nature of agricultural production systems

P1.2 describes factors that influence agricultural systems

P2.3 describes the farm as a basic unit of production

**Resources:** The School farm, Texts, local farmers, Aboriginal community members, library, and relevant videos

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>agricultural systems</li> <li>- the interaction between subsystems on a farm, resources, plants, animals, management and microbes</li> <li>- the patterns of climate and soil resources that influence the distribution of agricultural enterprises</li> <li>- the impact of physical, biological, social, historical and economic factors on systems</li> </ul>	<ul style="list-style-type: none"> <li>construct an appropriate model showing interactions between subsystems on a farm</li> <li>access information relevant to Australian agriculture.</li> </ul>	<p>P1.1</p> <p>P2.3</p> <p>P1.2</p> <p>P1.2</p> <p>P1.1</p> <p>P1.2</p>		<ul style="list-style-type: none"> <li>The Farm System</li> <li>- visit school farm and identify enterprises – cattle, sheep, pigs, chickens, pastures, vegetables</li> <li>- define terms inputs, outputs, processes/interactions</li> <li>- outline examples for some enterprises, eg Cattle.</li> <li>- Inputs – vaccine, drench, tailtags, feed</li> <li>- Outputs- steers for shows, local butcher</li> <li>- Interactions/processes – steer preparation, disease/ parasite resistance, digestion</li> <li>- draw a systems diagram</li> <li>- discuss and show interactions between resources, plants, animals, microbes and management</li> <li>Climate</li> <li>- Collect information about climate and soil in Agricultural and Australia. Identify agricultural regions and list their enterprises; discuss influences of climate and soil on selection of enterprises.</li> <li>Factors that affect agricultural systems</li> <li>- list factors that influence agriculture on Liverpool Plains.</li> <li>- discuss impacts of each on agriculture, eg. new technologies led to changes from sheep grazing to</li> </ul>





Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>- cycle</li> <li>- the physical resources of a farm</li> <li>- agricultural record-keeping</li> <li>- measures of performance on farms</li> <li>- problems associated with production on a farm</li>   <li>- the role of the farm manager</li> <li>- the impact of consumers on marketing</li> <li>• farm management</li> <li>- the key factors involved in the decisions made by the farm manager</li> <li>• marketing</li> <li>- the various ways in which agricultural products are marketed on the farm</li>   <li>• farm technology</li> <li>- technology used in management and</li> </ul>	<ul style="list-style-type: none"> <li>• calculate measures of performance</li>   <li>• gather data using appropriate instruments to measure resources, such as weather and soils</li>   <li>• identify and report on land degradation problems on the farm.</li> </ul>	<p>P1.1</p>     <p>P3.1</p>		<p>husbandry operations – joining, calving, marking, vaccination, drenching, weaning, marketing</p> <ul style="list-style-type: none"> <li>- costs and income, yields/ha, stock numbers, weight gains, weaning weights (use in HSC course for gross margin, FCR calculations)</li> <li>- land degradation or other problems</li>   <li>- use soil moisture probe to measure soil moisture</li> <li>- measure height of water table with piezometer</li>   <li>• Responsibilities and activities of farm manager – lan Carter</li> <li>- identify markets eg local trade beef – consumer preference for lean beef</li> <li>- marketing decisions -forward selling of crops, futures contracts, on-farm storage etc; cattle contracts, saleyards, consignment to abattoirs</li> <li>- select suitable crop varieties, timing of operations – eg planting crops, chemical applications (fertilisers – type/rate, herbicides, disease control)</li> <li>- cultivation practices – eg direct drill, crop rotations, stubble retention</li> <li>- strategies used to monitor, reduce/prevent impacts of dryland salinity eg saltbush, permanent pastures, opportunity cropping, piezometers</li> </ul>

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>production on the farm</li> <li>- technology used in marketing the products of the farm</li>   <li>• the agricultural workplace</li> <li>- potential hazards in agricultural workplaces</li> <li>- safe work practices employed in agricultural workplaces</li> <li>- animal welfare requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• identify potential hazards in agricultural workplaces, eg unsafe machinery</li>   <li>• use safe work practices</li> </ul>	P5.1		<ul style="list-style-type: none"> <li>• Technology <ul style="list-style-type: none"> <li>- use of computers for record-keeping, G.M's, weather data</li> <li>- precision farming equipment, fat scanners</li> <li>- CALM, sale by description, future contracts, internet</li> </ul> </li>   <li>• The agricultural workplace <ul style="list-style-type: none"> <li>- chemicals used on farm, farm machinery, equipment</li> <li>- safety features of farm equipment, use and storage of farm chemicals</li> <li>- design a mock 'Cattle Care' accreditation for the cattle yards</li> </ul> </li> </ul> <p><b>Farm Study Report - assessable</b></p>

Assessment

Farm Report Assessment Task (20%)  
Non – assessable tasks: Questions on farm study, methods of farm record keeping, degradation problems and work practices

**Title: Plant Production**

**Timing: 9 weeks**

**Outcomes:**

A student:

P2.1 describes the biological and physical resources and applies the processes that cause changes in plant production systems

P3.1 describes the role of decision-making in management and marketing of agricultural products in response to consumer and market requirements

P4.1 applies the principles and procedures of experimental design and agricultural research

P5.1 identifies the role of associated technologies and technological innovation in producing and marketing agricultural products.

**Resources:** Bread video and work sheets, strawberry runners, plant cuttings, soil test kit, fertilisers for practical test, wheat seeds, radish seeds, R.U.M liquid fertiliser, newspapers and magazines, Ag-facts for pest/disease research

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>• plants and their commercial production</li> <li>– basic morphology and function of leaves, stems, roots, flowers and fruits</li> <li>– regionally significant plants</li> <li>– consumer and market requirements for commercial plant products</li> <li>– propagation techniques</li> <li>• animals, climate and resource interactions</li> </ul>	<ul style="list-style-type: none"> <li>• identify a range of regionally significant plants</li> </ul>	<p>P2.1</p>		<ul style="list-style-type: none"> <li>• Plant production                             <ul style="list-style-type: none"> <li>- collect and draw a variety of plants from the school farm and label their parts – identify differences in leaves, roots, flowers and seeds</li> <li>- list range of crops grown in the district, native and introduced pastures, dominant trees, significant weeds</li> <li>- collect, press, dry and identify pasture species</li> <li>- discuss wheat grading system and end uses of the different grades</li> <li>- grow plants using a variety of propagation techniques eg strawberry runners, potatoes, cuttings and grafting</li> </ul> </li> <li>• Interactions</li> </ul>

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>- effects of soil texture, structure, pH, fertility on plant production</li> <li>- cultivation and/or grazing practices management for sustainable production</li> <li>- effective rainfall and the concept of the growing season</li> <li>• microbes and pests</li> <li>- their nature and impact on plant</li> </ul>	<ul style="list-style-type: none"> <li>• measure and describe the features of soil, including colour, texture, structure, pH, parent material and water-holding capacity</li> <li>• select appropriate tillage implements and/or techniques to establish a crop or pasture</li> <li>• collect and use meteorological data, eg temperature, rainfall, evaporation, effective rainfall</li> <li>• grow and monitor a crop/pasture from planting through to harvest</li> <li>• identify important</li> </ul>			<ul style="list-style-type: none"> <li>- make notes on effects of climate, animals and resource interactions on plant production – refer to farm case study</li> <li>- observe and compare structure and texture of 2 different soils; measure soil pH, dispersion tests, infiltration and drainage rates.</li> <li>- define meaning of terms - texture and structure</li> <li>- analyse and identify components of a soil</li> </ul> <p><b>Practical test*</b> - Effect of fertilisers on soil pH</p> <ul style="list-style-type: none"> <li>- compare tillage methods – eg conventional, minimum till, direct drill.</li> <li>- Discuss grazing management eg feedlotting, time control grazing</li> <li>- discuss systems used in local district, zero till, tree planting, Landcare issues</li> <li>- observe pasture species – discuss in relation to amount and seasonal distribution of rainfall; crops eg. chemical fallowing to conserve moisture, water holding capacity of soils etc</li> <li>• Climate</li> <li>- collect annual rainfall /temperature data from Post Office / internet (bureauofmeteorology.bom.gov.au)</li> <li>- graph monthly average rainfall/temperature.</li> <li>• Plant and grow wheat – (N.B. plant 3 plots at different densities to use in HSC interference trial)</li> <li>- collect, draw and label seedling stage, early tillering, late tillering, boot, flowering, and dough stages* (<b>Practical part of regional crop project</b>)</li> <li>- research information on fertilisers, herbicides, disease control and marketing of wheat (<b>research part of project</b>)</li> </ul>

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<p>production systems</p> <ul style="list-style-type: none"> <li>• technology <ul style="list-style-type: none"> <li>– use of technologies in producing and marketing plant product</li> </ul> </li> <li>• experimental design and research <ul style="list-style-type: none"> <li>– the role of a control</li> <li>– the collection and simple analysis of data</li> </ul> </li> <li>– recent findings that contribute to sustainable plant production systems.</li> </ul>	<p>diseases and pests of a selected crop/pasture</p> <ul style="list-style-type: none"> <li>• use a variety of sources to gather information about a specific agricultural problem or situation</li> <li>• design and/or conduct a simple trial using appropriate methodology</li> <li>• select fertiliser(s) appropriate to the soil and the requirements of crop/pasture</li> </ul>	<p>P5.1</p> <p>P4.1</p>		<ul style="list-style-type: none"> <li>• Pests and diseases <ul style="list-style-type: none"> <li>- refer to farm case study- eg stem rust on wheat, effect on plant and product, use of resistant varieties;</li> <li>- army worms – effects and control</li> <li>- research information and write a report on one regionally significant crop pest or disease, mentioning causes, symptoms, effects and control/prevention</li> </ul> </li> <li>• Technology <ul style="list-style-type: none"> <li>- Review technology used on case farm – eg cultivation equipment, precision planting equipment, wheat protein tests, forward contracts</li> </ul> </li> <li>• Biometry <ul style="list-style-type: none"> <li>- write definitions of terms used in biometry</li> <li>- plan and conduct a simple trial – eg Effect of R.U.M. (organic fertiliser) on growth of radishes - experiment to include a control,(no RUM), replication( 3 plots with R.U.M applied to soil /3 plots with R.U.M applied as foliar spray after 4 – 6 weeks./ 3plots without R.U.M - 30 plants per plot), standardisation (same conditions of water, soil, light etc), randomisation (selection of plots for treatments) Randomly select 10 plants from each plot to weigh at end of trial.</li> <li>- from experimental results calculate means, mode, median and range.</li> <li>- formulate a suitable conclusion.</li> <li>- Draw a suitable graph</li> <li>- collect media related to sustainable techniques used in plant production eg. direct drill machines, zero till, BT cotton</li> </ul> </li> </ul>

## Assessment

Formal Assessment –Regional crop project; , Practical test – effect of fertilisers on soil pH  
Informal Assessment – Pasture species collection, report on plant pests and diseases, experimental design – written report, graph and analysis of data from radish /R.U.M. trial

**Title: Animal Production**

**Timing: 9 weeks**

**Outcomes:**

A student:

P2.2 describes the biological and physical resources and applies the processes that cause changes in animal production systems

P3.1 describes the role of decision-making in management and marketing of agricultural products in response to consumer and market requirements

P4.1 applies the principles and procedures of experimental design and agricultural research

P5.1 identifies the role of associated technologies and technological innovation in producing and marketing agricultural products.

Resources: lambs or chickens at school farm, sheep/cow uterus from vet, animal welfare documents, data from feedlot trials, EBV data for fibre diameter.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>• animals and their commercial production</li> <li>– regionally significant animals</li> <li>– basic anatomy and physiology of digestive and reproductive systems</li> <li>– basic nutritional requirements</li> <li>– growth and development</li> </ul>	<ul style="list-style-type: none"> <li>• identify a range of regionally significant farm animals</li> <li>• manage and monitor the growth and development of a farm animal</li> </ul>	P2.2		<ul style="list-style-type: none"> <li>• Animal production</li> <li>- List regionally significant animal enterprises</li> <li>- draw digestive system of a sheep, label main parts and describe their function.</li> <li>- view, draw and label reproductive system of cow or sheep. Describe function of main parts</li> <li>- define feeds and pastures in terms of quantity and quality requirements for age, type and reproductive status of an animal.</li> <li>- interpret labels on feed bags</li> <li>- weigh and record single and twin lambs (if available) at school farm from birth to 8 weeks of age. Draw growth curve.</li> </ul>

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
<ul style="list-style-type: none"> <li>- safe handling and management techniques for the care and welfare of animals</li> <li>- the legal requirements relating to the care and welfare of the animal</li>   <li>- consumer and market requirements for commercial animal products</li>   <li>• plants, climate and resources interactions</li> <li>- management for sustainable production</li>   <li>• microbes and pests</li> <li>- their nature and impact on animal production systems</li>   <li>• technology</li> <li>- use of technologies in producing and marketing animal</li> </ul>	<ul style="list-style-type: none"> <li>• select and perform appropriate and safe handling and management techniques for the care and welfare of farm animals</li>   <li>• monitor the physical aspects of the environment of a selected farm animal</li>   <li>• identify important pests and diseases of an animal enterprise</li> </ul>	<p>P3.1</p>       <p>P5.1</p>		<ul style="list-style-type: none"> <li>- catch and hold lamb safely to administer drench</li> <li>- observe safe handling of sheep during crutching and shearing</li>   <li>- consult animal welfare documents on issues related to sheep eg shearing times, lambing times, marking etc.</li> <li>- additional research on other animals could include housing needs, size of cages/pens (chickens and pigs), feedlots etc</li>   <li>- discuss quality and quantity criteria use for wool – eg fibre diameter, fleece weights</li>   <li>• Interactions</li> <li>- discuss grazing management in relation to pasture growth and soil nutrients.</li> <li>- Evaluate different grazing systems as well as different methods of fodder conservation</li>   <li>• Pests and diseases</li> <li>- describe life cycle of sheep blowfly, assess impacts on animal and product. E</li> <li>- evaluate the range of management and control options.</li> <li>- observe crutching, shearing, lice control etc.</li> <li>- consult Ag-facts for another animal disease - report on causes, symptoms, effects, treatment/ control</li> <li>• Technology</li> <li>- use of EBV's in selecting animals for improved fibre diameter (production); marketing- fibre scanning</li> </ul>

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
products within animal welfare guidelines <ul style="list-style-type: none"> <li>• experimental design and research</li> <li>– the role of a control</li> <li>– the collection and simple analysis of data</li> <li>– recent findings that contribute to sustainable animal production systems</li> <li>– the ethical, legal and animal welfare requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• design and/or conduct a simple trial using appropriate methodology within animal welfare guidelines.</li> </ul>	P4.1		technology to determine SD and CV of fibre diameter, comfort factor <ul style="list-style-type: none"> <li>• Biometry N.B. experimental design already covered in Plant Production unit – only one trial required)               <ul style="list-style-type: none"> <li>- collect data from animal growth trials – eg feedlot steers.</li> </ul> </li> <li>*<b>Practical test</b> – Experimental design and analysis of data (using second-hand data)               <ul style="list-style-type: none"> <li>- discuss nutrition trials, feed additives OR artificial insemination, oestrus synchronisation and embryo transfer in cattle</li> <li>- refer back to farm case study – design of cattle handling yards and transport to minimise bruising</li> </ul> </li> </ul>

### Assessment

Formal Assessment – Experimental design and analysis Practical test Informal Assessment – Practical report – growth trial of lambs, report on animal disease, end of unit test
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