Teaching and Learning Program

Year: HSC Course 2001 **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 experienced Agriculture teachers, depending on enrolments, supported by a farm assistant employed for 22hours 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 sheep flock. 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 Higher School Certificate course builds upon the Preliminary course. It examines the complexity and scientific principles of the components of agricultural production, but places a greater emphasis on the place of the farm in the wider economic, environmental and social environment. The farm as a fundamental production unit provides a basis for analysing and addressing social, environmental and economic issues as they relate to sustainability, from a national and international perspective. This is achieved through the farm /product study.

Table of units:

CORE 70% (approximately 84 indicative hours)

1. Plant /Animal Production (45%) – 54 hours

2. Farm Product Study (25%) –30hours

OPTIONAL COMPONENTS 30% (approximately 36 indicative hours)

Research project (30%)	**OR**	**2 electives (15% each)**
Components include both a project report and process journal		18 hours per topic • Agribusiness • Horticulture • Innovation and diversification • Animal management • Plant management • Sustainable land and resource management

Formal School Based Assessment Schedule

No:	Task name:	Type	Value	Timing
1	Half yearly Exam	Examination	15	End Term 1
2	Environmental Impacts of Agriculture Project **- Irrigated Cotton Farm Study**	Field work + research	20	End Term 2
3	Interpretation and analysis of data (Pigs/zeolite)	Practical test and questions	20	Early Term 2
4	Research Project / Electives -Common task	Research and report	20	Early Term 3
5	Trial Exam	Examination	25	Mid Term 3

Title: Plant/Animal Production **Timing: 54hours (approximately)**

Outcomes

A student:

H1.1 explains the influence of the physical, biological, social, historical and economic factors on sustainable agricultural production
H2.1 describes the inputs, processes and interactions of plant production systems
H2.2 describes the inputs, processes and interactions of animal production systems.

Resources: Soil samples and soil testing equipment, Soil degradation video, Soil Save and Soil Loss programs, Pasture ID cards, books, leaflets on tillage implements, crop trial results from agronomist/ seed company, potted oats, seed oats, tomato seeds, wheat seeds, castor oil plants, labels from feed bags, chemical labels eg herbicide and drench, Ag-facts (diseases), young steer,2 litters of pigs, zeolite.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• sustainable agricultural production – the historical development of Australian land use practices, including Aboriginal practices, up to the present day – the chemical and physical characteristics of soil – techniques to maintain and/or improve soil fertility, including alternative				• Sustainable production - read accounts of past and present land use and condition and vegetation. Compare with present day use, condition and vegetation. Identify changes and possible causes of the changes - study a local soil in relation to: - physical soil characteristics – texture, structure, porosity, bulk density, dispersibility - chemical soil properties – pH, CEC, E.C etc - describe role of organic matter in soil - define and list examples of organic and inorganic fertilisers, discuss application techniques and impacts on soil, plants and water. - construct a table to show advantages and disadvantages of organic / inorganic fertilisers - draw N and C cycles – discuss importance to

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
strategies to the application of inorganic fertilisers – the role of soil nutrient cycles in Australian agricultural systems – the farming practices that have led to soil degradation, such as salination, acidification, soil structure decline and erosion, and the effects of these on soil and water – sustainable farming practices, including minimum tillage and crop rotation – the role of individual farmers, the broader community and government in reducing the harmful environmental effects of agriculture and in conserving water and protecting waterways – the tension between sustainability and short-term profitability in farming systems	• use a computer to simulate agricultural problem situations and test solutions • interpret a chemical label and relate it to safe practice and correct usage • research an integrated pest management program for a plant or animal production system			agricultural production/ soil fertility/ sustainability with reference to characteristics of Australian soils. - read articles on Namoi River – identify practices that lead to soil/water degradation. - design a cause and effects table - watch soil degradation video and make notes on soil degradation problems - use Soil Save and Soil Loss programs to simulate erosion • Sustainable farming - review tillage methods studied during Farm Case Study. - collect brochures from machinery retailers on types of machinery and tillage implements. - compare and evaluate traditional and zero till methods and impacts on soil and sustainability. - impacts of farming on broader ecosystems, examples of externalities – pesticide drift ◊meat contamination, clearing trees ◊ increased turbidity in streams, eutrophication, rising water tables etc. Discuss impacts of Native Veg Conservation Act – on farms, biodiversity and sustainability. - list practises that result in land/water degradation –

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• plant production systems – the processes of respiration and photosynthesis and net assimilation rate – the constraints imposed by environmental factors, including light, temperature, available moisture, oxygen/carbon dioxide ratios, wind and biotic factors on plant growth, development and production – the interaction of genotype with environment and the consequent opportunities for plant productivity – breeding systems and their genetic basis to improve quality and production of plants – the major	• make recommendations based on the interpretation of the results of agricultural			consider long term costs of degradation on farm productivity/profitability. - propose alternative strategies that reduce degradation but assist farm productivity and profitability eg fencing off swampy areas to establish a wetland to enhance biodiversity, destocking areas with gully erosion, exploring other income earning opportunities ***Commence Assessable project – Environmental Impacts of Agriculture (eg Irrigated Cotton Farm Study)** • Plant processes - read and makes notes on each process, its requirements and effects on plant production. - identify factors that limit efficiency of each process. - test leaves for starch, design experiments to show effect of light/ CO_2 exclusion on photosynthesis - define and give examples of biotic and abiotic factors that limit production. - list constraints and describe impacts on plant production. - Plan and write procedure for a simple experiment to test effect of one constraint – eg potted oats grown in different light intensities (full sun, partial shade, complete shade • Environment/genotype interaction - discuss environmental adaptations of tropical and arid plants – relate productivity to environment - compare yields of irrigated/ dryland cotton crops. - compare yields from conventional and genetically modified crops.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
components of interference in plant communities, ie plant competition, allelopathy, environmental modification of plants and plants acting as alternative hosts – the role of native and introduced pasture species in pasture management systems • animal production systems – the similarities and differences in the anatomy and physiology of ruminants and monogastrics – the nutritional requirements of a selected animal – the fate of energy in animal nutrition – the processes of growth and development in animals in terms of the proportion of muscle, fat and bone	experiments • investigate examples of plant interference, including weeds and planting density • use nutritional data to determine the suitability of animal feeds			- discuss selection criteria used in plant production eg disease resistance, grain yield • Plant breeding - research methods used in plant breeding – eg hybrids, tissue culture, genetic engineering. - present an oral report explaining application, benefits, disadvantages of one technique • Interference - analyse results of wheat density trial plant density trial (Prelim Plant Production) - carry out allelopathy experiment – eg Effect of castor oil plant washings on tomato and wheat - measure germination % and radicle length - write up procedure, tabulate results and make conclusion - identify and compare weeds, - outline effects on plant productivity and control methods including IPM • Pastures - collect and identify 5 native and 5 introduced pasture plants – discuss features, advantages/ disadvantages of each. - Assess methods of maintaining nutritional value of pastures eg time control grazing • Animal processes - observe and draw digestive systems of a monogastric and ruminant animal. - label parts and explain their functions - compare similarities and differences. - describe process of digestion ruminants and monogastric animals. - interpret labels on feed bags- discuss nutritional requirements in relation to type, age, sex,

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
– breeding systems and their genetic basis to improve quality and production of animals – the role of hormones in the regulation of animal reproduction and behaviour – the factors that limit the fertility of farm animals – ethics, welfare and legal issues and requirements • microbes and invertebrates – the role of microbes and invertebrates in the decomposition of organic matter and the fixing of atmospheric nitrogen via their association	• measure and monitor plant and animal production systems within animal welfare guidelines			reproductive status of animal. - define terms used in relation to feed energy – draw diagrams to represent fate and use of food nutrients - formulate a ration for a show steer, monitor growth, calculate FCR, analyse carcase bone-out data. - measure leg length and height of lambs of different ages (eg newborn, 3 months, 6 months, mature) - note differences and describe in terms of changes in relative proportions of muscle, bone and fat - interpret graphs of changes on % muscle, bone, fat – discuss in relation to age, breed, sex, market suitability of animal. • Animal breeding - define terms – pure breeding, line breeding, cross breeding- discuss examples, purpose, advantages / disadvantages of each. - identify objective measurements used in animal production eg daily weight gain of steers - identify subjective measurements used in animal production eg visual muscle scores (A - E) - list, identify source, and describe functions and effects of male and female hormones on animal reproduction and behaviour. - discuss potential use of hormones in regulating reproduction of farm animals eg roles of oestrogen, progesterone, testosterone in reproduction and behaviour - discuss effects of climate – (temperature, daylength) nutrition, breed (genetics) and management on fertility of farm animals • Animal welfare - Select an issue- eg feedlotting cattle, use of HGP's, intensive piggeries, battery hens and prepare an exposition for the issue

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
with legumes – the complex interaction involving problem organisms (pathogenic microbe or invertebrate), the host and the environment in plant and animal disease – the problems of pesticides and chemical resistance in target organisms – the importance of agricultural chemical labels as they relate to safe practice and correct usage – the use and potential for integrated pest management (IPM) • experimental analysis and research in plant/animal systems – the role of a control, randomisation, replication and standardisation of conditions – the collection and analysis of data				• Microbes and invertebrates - review N cycle, observe nodules on roots of a legume plant, draw diagrams to represent pathways for exchange of nitrogen between atmosphere, soil and plants. - describe processes and role of micro-organisms in nitrogen fixation, nitrification and denitrification and other soil processes • Disease - define terms relevant to disease – eg pathogen, host, immunity , vaccine, resistance. - Describe the disease triangle – interaction between pathogen, host and environment for one disease eg liver fluke in sheep. - research one plant and one animal disease – prepare report describing causative agent, transfer, symptoms, effects and control/prevention of disease • Pest control - discuss recent local problems with endosulfan drift and meat contamination. - describe reasons for development of resistance – eg drench resistance of worms in sheep and strategies used to overcome resistance problems - read and interpret label on an agricultural chemical, describe aspects of operator safety and protection, prescribed use/dose, method of application, dilution, with-holding periods etc - select a suitable example eg fluke control in sheep or heliothis in cotton and list components of an IPM program including cultural, mechanical, chemical – (organic / inorganic), biological and genetic engineering strategies • Biometry

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
– impact of research on agricultural production systems.	• analyse and interpret agricultural data, for example animal performance measures, climatic information and crop production data • Calculate a measure of variability (standard deviation using a calculator / computer			- design and conduct feed trial experiment with weaner pigs,(school farm of nearby piggery - Effect of adding zeolite to feed of pigs) Include control (no zeolite), replication (10 pigs in each group),Standardisation (same amount/type of feed, same climatic conditions, same genetics, size of pens) and randomisation (randomly select pigs for each group). • **Interpretation and Analysis of data- practical assessment** - weigh pigs at beginning and end of trial, calculate mean weight gain, standard deviation, and perform a test of significance. - explain significance of results and make recommendations to pig farmers re use of zeolite as a feed additive in diet of weaner pigs. - research and discuss results and impacts of agricultural experiments and research – eg crop variety /fertiliser trials, BT cotton, cloning sheep, genetically modified organisms/ foods

Assessment

Formal Assessment – Environmental Impacts of Agriculture Assessment Project, Interpretation and Analysis of Data (practical test) Informal – Disease report, pasture species collection, animal welfare exposition, practical reports, topic tests

Title: Farm/Product Study **Timing: 30 hours (approximately)**

Outcomes:
A student:

H3.1 assesses the general business principles and decision-making processes involved in sustainable farm management and marketing of farm products
H3.2 critically assesses the marketing of a plant OR animal product
H3.3 critically examines the technologies and technological innovations employed in the production and marketing of agricultural products
H3.4 evaluates the management of the processes in agricultural systems.

Resources: Videos on marketing, Kill sheets, score cards from carcase competitions, Market reports from Land newspaper, different cuts of meat for taste test (rump, topside, chuck, scotch fillet, shin beef). Computers with internet access.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• the farm as a business – the place of the farm in the wider agribusiness sector – the range of marketing strategies, for example vertical integration, contract selling, direct marketing, cooperatives, marketing boards, available to producers	• determine the marketing chain for a particular product	H3.1		• Farm business and production - review farm case study. Identify links between farm, agribusinesses, service industries, vet services, retailers etc within town – design a flow chart for beef enterprise - discuss options for selling beef and also marketing methods used for other products to show full range of marketing options. (videos – vertical integration, quotas, marketing boards, CALM etc) - review methods used by farmer (farm case study) for selling beef (saleyards, contracts, direct) - discuss advantages/disadvantages of each method. - visit local saleyards – complete survey sheet – talk to/ observe agents, buyers, producers, truck drivers

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
– the interaction between the farm and the market – ways in which governments can intervene in aspects of agricultural production and marketing • the marketing of a specific farm product – the quality criteria for the product – the importance of product specification in the marketing of the product – the processes involved in turning the raw agricultural commodity into various forms to	• schedule the timing of operations in a production cycle • assess the quality of the product of a plant or animal system			- discuss tail tags – colours/HGP's, vendor declaration forms, need for regulation and control. - discuss implications for product safety/quality and export markets - discuss impacts of climate, nutrition, pests, diseases and management on beef production and strategies used to ensure product meets market specifications – eg fat scanning, supplementary feeding, disease control, - visually appraise steers at the school farm/ participate in steer assessment competition • Beyond the farm gate - obtain different cuts of beef from a butcher, discuss visual quality indicators – predict and rank eating quality of each cut. Cook then taste each cut – compare eating quality with predictions. - Write report on findings of taste test activity - list factors that determine quality in beef and their importance – compare quality criteria used for export and local trade beef - discuss standards, methods and technologies used to assess quality eg VIA, MSA etc - identify product specifications required for export and local trade - relate specifications to quality and consumer requirements - analyse carcase data • **Beef Processing and Marketing –Assessment Task - Recount** - Visit abattoir and observe processes involved. - draw flow diagram to represent steps involved - discuss level/type of processing required by

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
satisfy consumer demand – the role of advertising and promotion in the marketing of the product – the nature and potential for value adding on the product • decision-making processes and management strategies – assessment of the performance of systems and decision-making based on measurements of quality and quantity – the financial pressures that have an impact on farmers, including the irregular nature of income, high expenditure on inputs, the dynamic nature of markets and interest rates, risk management – the problems that may occur in meeting	• interpret supply and demand information for the product. • evaluate marketing information, such as a sales report, for a product • calculate a gross margin for an enterprise	H3.2 H3.4		different retail outlets/markets - visit supermarket and butcher shop – observe presentation and advertising methods used at point of sale. - collect or view other forms of advertising for beef, interpret advertising message, target consumers, evaluate effectiveness. - observe cryovac process, view presentation and range of cuts/ mixes (eg crumbed, marinaded, stir fries) in supermarket and butcher shop – list methods and suggest reasons for value-adding beef • Feedback - obtain kill sheets from abattoir, score cards from carcase competitions, analyse and discuss how producers use and respond to information. - discuss management options for improving quality of product eg supplementary feeding, cross-breeding. - use internet to access information on beef consumption, exports etc (ABARE, AMLC sites) - graph trends over the last 10 years - compare with trends in chicken, lamb and pork. - discuss changes in consumer tastes and preferences and reasons for them. - discuss changes in supply and demand for beef – domestic and export. Suggest ways farmers can respond to changes / reduce risk. - collect market reports from Land newspaper – analyse price variations over time. - using current prices/costs or information from farm case study –construct a gross margin for a beef enterprise.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
market specifications agricultural technology – the impact that scientific research and associated technology has had on agricultural production and marketing.		H3.3		• Technology - list impacts of scientific research on beef production and marketing. - discuss role of Cattle Care, EBV's fat scanners, video image analysis, electrical stimulation and other technologies.

Assessment

Formal Assessment – Beef Processing and Marketing Assessment Task (based on abattoir, supermarket and butcher shop visit)

Informal Assessment – Saleyards survey/question sheet, report on Internet research on beef consumption etc, taste test practical report, end of unit test

Title: Optional Research Project — Timing: 36hours

Outcomes:
A student:

H3.4 evaluates the management of the processes in agricultural systems
H4.1 applies appropriate experimental techniques, technologies, research by methods and data presentation and analysis in relation to agricultural problems and situations
H5.1 evaluates the impact of innovation, ethics and current issues on Australian agricultural systems.

Resources: Copies of past projects, HSC on-line – .hsc.csu.edu.au/

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• processes in agricultural systems by: – conducting an independent investigation in an agricultural situation – using data/ information from research to evaluate the management of agricultural processes • research methodology and presentation of research by: – identifying a research question that could		H3.4		• Developing a project topic - analyse and discuss rules for research project in syllabus - view a number of projects undertaken by previous students. - identify interests of and resources available to students - discuss types of research projects – eg consumer or producer surveys, market research, original (student) experiments, analysis of second hand data, simulations etc - visit HSC on-line site - brainstorm possible topics of a contemporary nature - analyse resources and equipment needed for suggested topics - consider time and seasonal constraints – consider and discuss feasibility and determine most suitable research topic - undertake a contract with student to guide

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
be investigated – accessing and evaluating sources of information pertinent to the question being investigated, eg a review of the literature – selecting appropriate research methods to find answers to the questions being investigated – collecting, presenting and interpreting data in a way appropriate to the research methods used – evaluating and communicating the processes and results of research in a formal report and through a process journal • innovation, ethics and current issues by: – identifying issues relevant to the ethical behaviour and responsibilities of agricultural researchers		H4.1		implementation and progress of project and begin process journal. - investigate sources for information and guidance– eg visit Research Station, Field Centres, agronomists, farms, access internet, etc. Collect required resources and analyse information *** Begin work for Common Assessment Task** (see below) • Starting the project - assist students to determine suitable methodology – design of trial / survey etc- ensuring design is appropriate, valid and ethical and a suitable method for statistical analysis is planned - discuss strategies needed to obtain results - assists students to interpret results and ideas for presentation of results, organisation of relevant data, types of graphs, tables, analysis and discussion of results • Monitoring - check process journal at regular intervals, negotiate suitable timeline for completion of tasks. - proof read and make recommendations on each section of report as it is completed. - Critique students' project draft and journal to encourage good communication, literacy, appropriate length and continuity - suggest people/facilities/ methods for improving information and its presentation - investigate previous work/ experiments/surveys etc done in the field of research that student is undertaking. - discuss ethical issues relevant to topic – eg animal welfare, safety, honest reporting of results, realistic scales for axes of graphs etc

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
– considering issues of ethics and welfare in the design of the research – making some recommendations from the research that could be of use to others and lead to further research.		H5.1 H4.1, H5.1		- assist student to formulate conclusions from practical work, evaluate methodology, suggest further research required or improvements needed to validate results - identify recommendations that could be made to farmers based on their research findings • **Common Assessment Task** Based on your research project: - Identify your research question and describe your methodology - Explain benefits to farmers that could result from the research/ investigation - Identify impacts of your research on agricultural productivity/profitability/marketing/environments - Discuss ethical issues that need to be addressed to ensure acceptability and adoption of the results of your research findings

Assessment

Formal Assessment – Common Assessment Task
Informal Assessment – process journal and meeting contract requirements.

Title: Elective 6- Sustainable Land and Resource Management Timing: 18hours(approximately)

Outcomes:
A student:

H3.4 evaluates the management of the processes in agricultural systems
H4.1 uses appropriate experimental techniques, technologies, research methods and data presentation analysis in relation to agricultural problems and situations
H5.1 evaluates the impact of innovation, ethics and current issues on Australian agricultural systems.

Resources: Organise farms to visit ('*Temi" or 'Glenkerry', 'Connamara*") Soil testing equipment, Abney level, Land Capability Assessment booklets, videos – Salt of the Earth, Soil Degradation, USER etc, E.C. meter, crop seeds (sorghum, corn, wheat, barley, sunflower, Lettuce seedlings, Landcare brochures, pamphlets on soil degradation, native vegetation, water licensing

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• processes in agricultural systems by: -applying the Australian land capabilities system to the local area in order to compare existing land use to that suggested by a land capability assessment, to ensure sustainable land use -discussing the effects of soil degradation on agricultural productivity and sustainability		H3.4		• Land capability assessment Visit several different sites on *Glenkerry* or *Temi* and : - measure slope, soil properties (eg texture, structure, pH ,EC and infiltration rate) assess % ground cover, tree cover aspect etc. - Identify current land use and management - use land capability assessment criteria to assess capability of each site - compare existing land use to that recommended for the particular land class - suggest strategies needed to ensure sustainability – eg excluding stock, diversion banks, crop rotations • Land and water degradation - research and discuss impacts of soil degradation on farm productivity.

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
-discussing the issues related to water quality, supply and regulation -examining the causes of the following types of soil degradation: soil erosion, dryland salinity, irrigation salinity, soil acidification and soil structure decline (with special reference to those arising from farming practices) -explaining in detail the processes that have led to **one** of the above types of soil degradation and outlining the extent of this soil degradation problem in Australia, with specific reference to effects on plant and animal production • research methodology				- interview farmer affected by dryland salinity and record changes in quality and quantity of yield, effect on profitability, soil structure, water etc - map water storage facilities in the area. - discuss impacts of agriculture on quality and quantity of stored water (turbidity, eutrophication, salinity) - discuss impacts of regulation on aquatic ecosystems and fluvial processes - invite DLWC representative to talk about irrigation, water licences, environmental flows etc - refer back to core unit information for causes of each type of degradation - list farming practices and natural processes that lead to development of the problem - Soil degradation video, Salt of the Earth video and worksheets, Understanding Soil Ecosystem Relationships video kit) - refer back to salinity crop yield data or re-visit case farm (*Connamara*- Pine Ridge) and: - measure electrical conductivity of soil - measure height of water table in piezometers - discuss possible reasons for problem eg topography, geology, clearing in upper catchment - analyse soil texture and structure in areas affected / not affected by dryland salinity - describe exactly how soil becomes saline - set up and conduct experiments to show: - effect of salt concentration on germination rates of various crop seeds - effect of salinity on growth of potted plants eg lettuce seedlings - write report, tabulate results and make conclusions about impacts of salinity on plant and animal production

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
and presentation of research by: – analysing a study of innovative technologies or practices that are assisting with the conservation and efficient use of water in agricultural production systems • innovation, ethics and current issues by: - examining and evaluating the current recommended procedure to alleviate the problem studied above with special reference to the physical and biological processes occurring in the soil - analysing the strategies and innovative activities occurring in programs related to total catchment management landcare and whole-farm planning as a means of dealing with sustainability in		H4.1 H5.1		**Common Assessment Task** Select an innovative technology or practice which assists with the conservation and efficient use of water in agricultural production (brainstorm or research for ideas) and: - describe the technology / practice - explain how it can benefit production and its potential for ensuring conservation and efficient use of water - identify impacts of this technology / practice on the quantity and quality of water, farm production, aquatic and terrestrial ecosystems, farm profitability - discuss ethical issues that need to be addressed to ensure acceptability/ protection of aquatic ecosystems / equity of supply / licensing arrangements etc • Innovations, ethics and current issues - during farm visit, observe strategies used by farmer to alleviate problem of dryland salinity and evaluate their effectiveness – eg opportunity cropping uses available soil water and prevents it accessing water table, saltbush prevents soil erosion in bare areas, provides feed for sheep and returns productivity and profitability to land area. - research other methods and techniques used to monitor / control problem eg electromagnetic surveys, tea-tree plantations, salt tolerant species. - visit Landcare project sites in local area/ attend Landcare meeting /invite Landcare representative and define: - role of Landcare - activities and projects undertaken by Landcare - sources for funding of projects and community contribution - benefits derived from Landcare eg stabilisation of creek banks, reduced erosion, improved water quality - integration of Landcare with catchment and vegetation management and catchment and individual farm plans

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
agriculture - discussing the importance of the attitudes of farmers and the wider community to effectively achieve environmental, economic and social sustainability in agricultural systems - appreciating the role of the government in land and resource management.				- students use information to write a report on Landcare - discuss strategies used to develop a whole farm plan - discuss advantages of whole farm planning to farmer, farm and broader ecosystems. - relate all of the above to achievement of sustainability • Attitudes and sustainability - use examples to show how activities of farmers can impact on ecosystems beyond the farm eg over-clearing trees accelerates erosion leading to siltation downstream, excessive use of fertilisers can result in eutrophication of waterways etc - consider in terms of costs and benefits - discuss responsibility of farmers/operators eg - to use pesticides wisely, prevent soil erosion - discuss changing attitudes of farmers and communities to land use through Landcare and TCM programs - consider strategies/education programs that can be used to change attitudes and promote sustainable land use. - investigate existing legislation controlling land and resource use eg Native Vegetation Conservation Act, EPA Act, water licensing. - discuss roles/responsibilities of government, government agencies in fostering responsible land and resource use

Assessment

Formal Assessment - Common Assessment Task
Informal Assessment –Report from farm visits- (1) Land capability field work ,(2) Dryland salinity visit, practical reports, Landcare report , topic test

Title: Elective 2 - Animal Management **Timing: 18hours (approximately)**

Outcomes:

A student:

H3.4 evaluates the management of the processes in agricultural systems
H4.1 applies appropriate experimental techniques, technologies, research methods and data presentation analysis in relation to agricultural problems and situations
H5.1 evaluates the impact of innovation, ethics and current issues on Australian agricultural systems.

Resources: Genetic Engineering Kit and videos, Rural research, Issues magazines, Vaccine, PRID

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
• processes in agricultural systems by: - relating knowledge of animal hormonal systems and reproductive anatomy to breeding techniques and reproductive management				• Reproductive anatomy and physiology - view and draw reproductive systems of ram and ewe - list male and female reproductive hormones and explain their function/ effect - discuss how knowledge of above is used to manage and manipulate reproduction and in reproductive technologies- eg artificial insemination, embryo transfers
- evaluating management techniques available to farmers to manipulate the rates		H3.4		- identify and evaluate techniques used to manipulate growth – eg HGP, PST, crossbreeding - and reproduction –eg hormone treatments used to synchronise oestrus, cause super-ovulation etc

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
of growth, development and reproduction in farm animals, including the use of chemicals and hormones				- invite vet to speak on / demonstrate PRID and other techniques/ chemicals used to manipulate reproduction
- outlining the role of objective measurement and heritability on the breeding programs of farms, using at least one specific program used in one animal industry				- discuss what objective measurements are and how they can be used. - list types of objective measurements relevant to animal reproduction – eg scrotal diameter, sperm counts, EBV"s. - define heritability – discuss characteristics influenced/not influenced by the environment - discuss characteristics determined by single and multi-gene inheritance. And relate to heritability - clarify meaning of high and low heritability and give examples of such traits – relate this to rate of genetic progress. N.B find clear examples for a particular animal industry –eg milk yield and fat content of milk; marbling and growth rates in cattle
• Disease - describing the nature of the immune system in terms of antibody, antigen, vaccine, immunity, antitoxin and linking it to the prevention of diseases by vaccination				- list and define all terms used in relation to animal disease - describe and give examples of diseases - discuss the development of active and passive immunity and give examples - describe nature and action of vaccines - research report on a particular disease – the pathogen, animal's natural defences, types of treatments(vaccines/ antiserum/ antitoxin) available and how they work
• research methodology and presentation of research by: -analysing a study of		H4.1		**Common Assessment Task** Select a technique or technology relevant to advancing productivity (brainstorm or research for ideas) and: - describe the technique/technology - explain how it benefits production and its potential use in

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
a current technique/ technology which is advancing productivity in animal production systems • innovation, ethics and current issues by: - discussing the impact or potential impact of genetic engineering and associated genetic technologies on animal production systems -evaluating changes being made to breeding systems and techniques in terms of their impact on reproductive efficiency, product quality, individual farm breeding programs and animal adaptability in a wide range of commercial industries - discussing the advantages and disadvantages of various management practices associated with disease control, with emphasis on		H5.1		an animal industry - identify impacts of this technique/ technology on the animal, animal products, costs of production, environment, non-target species, health and safety - discuss ethical issues that need to be addressed to ensure acceptability/ safety of use • Innovations, ethics and current issues - refer to genetic engineering video kit in library and other videos and articles – eg Rural Research, Issues magazines, video and articles on chitinase- use to prepare an exposition, explaining: - what it is/ how it works - eg sheep with chitinase gene secrete a chemical that kills blowfly maggots in wool – this increases resistance to blowfly strike - advantages / disadvantages – eg possibility of maggots developing resistance if chemical secretion is not strong enough, reduces stress to animal caused by maggots, overcomes need for mulesing or other control methods, improves product quality etc

Students learn about:	Students learn to:	Outcome No:	Register	Strategies and activities:
animal welfare issues, environmental protection, chemical resistance in target organisms and human safety - outlining some of the issues (for example economic, management, social, legal and ethical) that may have an impact on the successful implementation of new technologies in animal production systems.				- Issues – eg cost of implementing technology, inheritance of gene, potential side -effect on animal and its products, patenting gene, community acceptance etc

Assessment

Formal Assessment - Common Assessment Task Informal Assessment – Disease report, Genetic engineering report, topic tests