"B.A.A.T."

BULLETIN OF THE N.S.W. ASSOCIATION OF AGRICULTURE TEACHERS

AUTUMN 1994



FROM THE EDITOR..

Welcome to 1994, and my sincere apologies for the delay in this first edition reaching you. Barrier after barrier, combined with the speed of first term have combined to slow production of the Autumn issue. I am sure however, that some of the material in this edition, has been well worth the wait. In particular, the suggested answers for the 1993 H.S.C. are probably the most comprehensive yet. Last year people expressed (via the evaluation sheets in each edition) a need to see some advice on essays and 3 Unit, which have been included this year.

Thanks to all those who did take the time to return the evaluation sheets in 1993, it really does help in putting each edition together. Please take the time to do so for this edition, the more returned the better.

Programming for the senior syllabus is probably well underway in most areas and many may feel they are battling. To those who are progressing well, I would like to request you send me any ideas and/or information you may have, to include in the next issue. Any suggested assessment guidelines you have developed would be particularly appreciated.

Whilst on the topic of programming, I would like to inform you that I have a copy of the new syllabus and outcomes statements on disk. This was sent on request from the Board of Studies to me at the end of last year. Many of the Ag teachers have found it to be a huge time saver, allowing computer cut and paste techniques to be employed in preparation of teaching programs. If you would like a copy, please send me a Mac formatted disc (Word version 5) and include something to cover return postage and I will do it as soon as I receive it.

Good news for the North West and Agriculture in general, with the Appointment of James White as the T.A.S. Curriculum Consultant. I am sure Jim (formerly from Guyra Central School) will continue to promote Agriculture as an important component of the T.A.S.K.L.A., an area unfortunately often overlooked. As Agriculture teachers we must continue to promote our subject and having people in positions such as these can only help our plight.

I am aware many teachers have some concerns over the marketing implications in the new senior syllabus, and to a lesser extent sustainability issues, in terms of finding information. I would like to point you towards any of the industry newsletters and publications. I have included a couple of articles to outline some of the information in these numerous publications. Get your school on the mailing list, more than often its free!

John Lee sent me an article from The Land, "Ending City Myths" that has been included later in this issue. I thank him and numerous others who have been sending information for this and all past issues. It seems people are really starting to find the time to share the resources they encounter. KEEP IT UP!! PLEASE!! We all benefit. Special thanks to the conference report written by Peter Jones in his usual jovial style.

Thanks also to George Liddell from Tweed River High in supporting his idea to feature a school from each region in each issue of B.A.A.T.. George has got the ball rolling by sending something on his school! Please let me know if you are interested in featuring your school in other issues, otherwise pleases co-operate if you are selected at "random" in the future. I am sure we can all learn something new so hopefully this initiative will continue well into the future.

Enough from me, please enjoy the 1st issue of B.A.A.T. for 1994, I hope it continues to meet some of your many needs as teachers of a most dynamic subject.

STUART HEMMINGS.

CONFERENCE NOTICE

DATE OF CONFERENCE
21ST TO 25TH JANUARY 1995
VENUE- LAKE AINSWORTH SPORT AND RECREATION CENTRE
LENNOX HEAD

NOTICE FOR PEOPLE APPLYING TO PROFESSIONAL DEVELOPMENT COMMITTEE.

RE- FUNDING FOR THE CONFERENCE.

The maximum registration and accommodation fee will be $300 at present estimates, without sponsorship.

There are 4 cottages available at $480 per week from Saturday to Friday. Self contained with two bedrooms and beds for 8 people.

Cottages will be allocated on the basis of the arrival of applications with deposits. The cottages are big enough for two families if people wish to combine. Meals will be provided only for the time of the conference.

George Liddell
Conference Convenor

TOTAL P.02

PRESIDENT'S REPORT

Welcome to 1994

I hope everyone has had a happy and relaxed holiday and is looking forward to the challenges of 1994.

During January I was fortunate enough to be able to attend the National Association of Agriculture Educators biannual conference at Katoomba. This was a most enjoyable Conference with representatives from all Australian states present; this enabled a lot of productive interaction that, I think, will have some long term benefits for all Agriculture teachers. Hopefully there will be a more detailed report on this Conference elsewhere in this publication.

Jenni Wilkins must be congratulated on her organisation of the Conference and also on being elected President of the National Association. Congratulations Jenni, a job well done on both counts.

By now I suppose everyone is hard at work again. One of the major concerns I guess everyone is having is trying to program and implement the new Syllabus for the Preliminary course. If you have any ideas, program attempts, questions, problems etc that you would like to share with others I am sure Stuart would like to hear from you as soon as possible so that he might include these in the next issue of BAAT.

While talking of Syllabi the Agriculture Syllabus Committee is hoping to have the new 3 Unit Syllabus ready to go to a Board of Studies meeting on 11 April. If the Board approves the Syllabus then it will go the consultative network for comment. Hopefully the whole process will be completed and the 3 Unit Syllabus will be in schools by the end of Term 3.

The other interesting development to come from the Board of Studies is their decision to appoint a Curriculum Officer (Agriculture Education). Initially this appointment is for one year. However if you think there is value in having this appointment you might communicate your thoughts to me and through the Association we may be able to do something to extend the position.

Much of the credit for the creation of this position must go to the lobbying efforts of Vivienne Sunderberry and the NSW Farmers Association in their attempts to improve Agriculture Education in NSW.

I hope that 1994 is satisfying for you and that you achieve your aims for the year.

JOHN LEE
PRESIDENT

BOARD OF STUDIES
NEW SOUTH WALES

35-51 Mitchell Street
McMahons Point 2060
PO Box 460
North Sydney 2059
NSW Australia
Fax (02) 955 3557
Tel: (02) 925 8111

Mr J Lee
Glen Innes High School
Edwards Street
GLEN INNES NSW 2370

Our reference
E82/02364
NB:AS 3.412
Your reference

11 February 1994

Dear Mr Lee

I refer to a recent telephone conversation with our office and also to the Charles Mullavey Memorial Award sponsored annually by your organisation.

I am pleased to advise that the candidate with the highest academic achievement in 2 Unit Agriculture and the top 3 Unit Project at the 1993 Higher School Certificate Examination were:

2 UNIT

Rooshdiya Zehra KARIM
36 Japonica Road, EPPING NSW 2121
Rooshdiya attended James Ruse Agricultural High School.

3 UNIT PROJECT

Sarah NEWMAN
'Malboona', Yarrabin Road via MUDGEE NSW 2850
Sarah attended Hurlstone Agriculture High.

As you may be aware, the 1993 Higher School Certificate was based on both Moderated Assessments and on the Higher School Certificate Examination. In determining the candidate to be recommended for the 2 Unit prize, the Board of Studies has taken both factors into account.

Yours sincerely

J S Cook
General Manager
Examinations and Assessment

(4)

A Report On The Eighth Biennial Conference of the National Association Of Agricultural Educators - Katoomba 23rd to 27th Janunary 1994

The throng started to gather on the Sunday night around the pool. [A pool at Katoomba ?? .. Sounds as common as a tree in Antarctica ..... and about as half as useful.]

As the sun set the bar opened. (Was that the official start of the conference or just the start of a little more liver damage?)

It wasn't long before the Queensland delegates stood out amongst the crowd. They were the ones with the jumpers and coats. The Victorians and the Apple Isler (there was only one) thrived as the temperature dropped to a mild 15oC .

I stood back and pondered. Was I ready for 4 days of conference ? Was the Mountain Heritage ready for "Ag teachers"?

As all good educators know it is important to create the ideal learning environment if your students are to learn to their optimum. Let me attempt to set the scene for the conference. Close your eyes (after reading this) and try to imagine:

* viewing sheer cliffs stretching from cloudless blue skies to the valley floor a thousand feet below
* sipping freshly squeezed orange juice
* eating as much bacon and eggs (poached or fried) as you want. ... Or are freshly baked croissants more your style ? (that of course was just part of the breakfast menu).
* big deep comfy lounge chairs
* from the ceiling are chandeliers
* a bar that stays open as long as you want
* upstairs the maid has just remade your bed and you know there will be fresh fluffy towels hanging in your private bathroom.

I decided that Jenni Wilkins (conference organiser) had chosen well. I should be able to optimise my learning at the Mountain Heritage Country House Retreat.

It was Monday morning when the "heavy" stuff started.
EI President John Lee was the first cab off the rank. He introduced Prof. Murray Hawkins from the Muresk Institute of Agriculture W.A.. Murray was the conference chairperson.

The conference was then officially opened by Mr Reg Pollock (Assistant Director General. Met. West Region)

Most of Monday was taken up by speakers addressing the 45 or so delegates. Unfortunately time and space restricts what I can mention about the context of each speakers presentation. The following is a list those who presented a paper on the Monday, the organisation that they represent and also the title of their paper.
- Prof. Peter Cornish, University of Western Sydney, Hawkesbury who gave the key note address titled "Foundations For Prosperity".
- Mr Michael Burlace, Organic Farming Officer, NSW Agriculture - "The Role Of Organic Farming in Agriculture".
- Mrs Vivienne Sinderberry, NSW Farmers' Federation - "Agricultural Education And Training In NSW"
- Dr. Rod Francis, Charles Stuart University, Wagga - Agricultural Education Through The 90's"
- Dr. Perry Share, Charles Stuart University, Wagga - " Sustainable Agriculture In A Sustainable Rural Community"
- Mrs Julie Austin, National Farmers' Federation - The Role Of The National Farmers' Federation In A Sustainable Future For Australian Agriculture"

Monday also saw our first computer workshop. Time was allocated so that all of those who wished were allowed to have lots of "hands on". Mike Toms and Ron Bryant showed their goodies as well as Rod Thompson from the DPI, CSIRO, CaLM and the Centre For Tropical Pest Management Uni. of Queensland. It is obvious that computers will have an ever increasing role in Agriculture.

The Biennial General Meeting of the N.A.A.E. was held after dinner on Monday night. The following is a list of the newly elected excutive:

President Ms jenni Wilkins
James Ruse Agricultural High School
Carlingford NSW 2118
Phone (02) 871 7126
Fax (02) 871 3874

Secretary Mr Peter Lynes
Beenleigh State High School
PO Box 29
Beenleigh Qld 4207
Phone (07) 287 2888
Fax (07) 807 5728

Treasurer Mr Anthony Jokantas
Nhill Secondary College
PO Box 210
Nhill Vic 3418
Phone (053) 911 300
Fax (053) 912 140

(All correspondence regarding issues should be sent to the Secretary.)

Tuesday saw the first of the conference tours. The delegates saw first hand the extent of the devastating Grose Valley fires whilst travelling to the Richmond / Windsor area. A talk at the Hawkesbury Lookout by the local Dept. of Agriculture agronomist set the scene in the minds of those from interstate as to the role of agriculture in the Hawkesbury - Nepean Basin.

During the rest of the tour the group also studied;
- mushroom growing in one of the most automated systems in Australia.
- the Uni Of Western Sydney Hawkesbury Dairy
- A free range poultry trial at the Uni.

Some keen travellers also studied at close hand the bottom of the swimming pool at the Uni (aquaculture??)

Tuesday afternoon saw addresses from the following people:
- Mr Richard McEvoy, Rural Training Council Of NSW - " The Role Of The Rural Training Council Of NSW In Technology Education"
- Mr Norm Thomas, Armidale - "Views Held By Agricultural Teachers In NSW On The Future Of Agricultural Education.

An open forum was also conducted by Mary Jane Mahony, University of Sydney, Orange and Ken Langford, University Of Western Sydney, Hawkesbury. The topic for this forum was "Issues in Australian Agricultural Education".

To top of a rather full Tuesday delegates donned neat garb (including ties) for the conference dinner. The J.S. Sutherland Memorial Address was Dr John Drinan, Director for the Centre For Advancement Of Learning and Teaching , University Of Newcastle.

For those who thought Tuesday was a packed day Wednesday was a new experience. Coach trip number two... But this time we were leaving earlier and getting back later... much latter . We covered about 600km and most of that was on dirt winding roads. ..(Real "six" finger country.) Wednesday was sheep day. First the party travelled to Rockley (south of Bathurst) where we viewed Texel and Finnish Landrace sheep. In the afternoon it was prize winning Grathlyn fine woolled Merinos at Hillend.

What most interstate delegates will remember will be the dropping down off Forrest Elbow when we did the lap around Mt Panorama .. or will it be when we blew the battery junction lead somewhere north of Hillend. This cut out the air conditioner and our movie. A little bit of improvision got us into Mudgee were (realising that dehydration is a major life threatening problem in our dry country) we headed for one of the wineries so as to rehydrate and dine.

Thursday morning saw the last of the presentations. These included:
- Dr Alan Brownlee, CSIRO, Division Of Animal Production, Prospect. - "New Technologies For Improved Agriculture"
- Ms Sonia Muir, NSW Agriculture, Orange - "The Role Of The Rural Women's Network"
Time allowed for two more workshops on computers and organic farming before the "last supper".

Throughout the conference the delegates had ample opportunity to gain a fantastic amount of professional knowledge. The speakers often stirred deep into the thoughts of those who attended. An unmeasurable amount of learning also occurred over the meal breaks and sitting in those comfy arm chairs with a "soft drink".

Such a successful conference would not have been possible without the strong leadership and organisational skills of Jenni Wilkins. Great work Jenni.

The following companies and organisations also assisted by sponsoring the conference
- CaLM
- NSW Agriculture
- Australian Educational Suppliers
- INCITEC
- NSWAAT
- The Land
- Computer Lighthouse

The next 9th Biannual Conference will be hosted by the Victorian Ag. Teachers. It is proposed to hold it at Shepparton. The exact date is yet to be fixed. I can only recommend that, if the next conference is anything like the one that was just held, it will be time well spent.

Pete Jones.
Cobar High School.



Farm wages - p54

AS I SEE IT

by Images Editor Linda Gross



Ending city myths

A PUSH towards having Australia's agricultural industries and producers better understood is a proposal of great merit.

Both the NSW Farmers Association and the State Government, have put forward the idea to have 1998 become the International Year of Agriculture.

It is important that people the world over realise the importance of primary industry, and that it is the "bread and butter" of most countries' economies.

Urban people, in particular, need to be made more aware of the actual process of farming, and what influences have an effect on the income of many farming families.

In the schools, agriculture should be made compulsory, not so much making students grow a crop or milk a cow, but children should be taught how the system works and how much society depends on farmers and their primary products.

For a long time it has been said, and it is true in many cases, that city kids think milk comes out of cartons and the same for eggs.

Many also don't know that wheat goes into making bread, and bacon comes from pigs.

Perhaps the Board of Studies, who are responsible for setting the syllabus for bo primary and high schools in NSW, woulc be better off changing their syllabus to teach urban children where things such a milk and eggs come from, rather than changing the Australian history syllabus it teaches children that Australia was 'invaded' rather than 'settled'.

Education is the key word in any learni process, and if we want people to learn a appreciate the agricultural sector better, a education campaign should be started.

It will be timely to have rural people an their lifestyles highlighted just two years prior to the year 2000 Olympic Games in Sydney, however, we don't have to wait until 1998 and the proposed Internationa Year of Agriculture to set the wheels in motion.

Agricultural organisations should begir to lobby educational groups such as the Board of Studies, to have courses in rural studies and agriculture introduced as par of the school curriculum similar to mathematics and science.

Some schools apparently don't even offe agriculture as an option, but in recent times, we have seen a growing number o metropolitan schools establish agricultura courses, in answer to a demand by childr to become more involved in the rural scer

We should take advantage of the popularity of anything rural or related to the bush, which has been experienced in recent years, and utilise that interest to better educate people about what goes or "behind the scenes" in the rural sector.

There's far more to being a "rural" than wearing a pair of moleskins and R. M. Williams boots, and city people should be made more aware of that.

For a start they seem to think in the city and in other areas, for that matter, that it only takes a good shower of rain and the drought is broken, and even when people in the bush receive enough rain to break the drought they aren't guaranteed of goc prices for their stock or crops.

Urban dwellers also don't understand that when the price of milk, eggs, and ste goes up in the shops, the increased reven is not necessarily handed down to the producer.

Perhaps by educating young people fro school age they will have a better understanding of such an important industry, and take more of an interest in i future.

NATIONAL ASSOCIATION OF AGRICULTURAL EDUCATORS

N.A.A.E. Executive 1994-5.

PRESIDENT:	**Jenni Wilkins** James Ruse Agricultural High School Fenton Rd. Carlingford 2118	ph 02 8717126 fax 02 8713874 home 02 5609969
VICE PRESIDENT:	**Brad Ensbey** Noosa District High School Tulip St. Cooroy 4563	ph 074 476622 fax home 074 476 561
SECRETARY:	**Peter Lynes** Beenleigh High School PO Box 29 Beenleigh 4207	ph 07 2872888 fax 07 8075728 home 075 463 723
TREASURER:	**Anthony Jokantas.** Nhill College PO Box 210. Nhill 3418. Vic.	ph 053 911300 fax 053 912140 home053 911869
PUBLICITY :	**Pam Brookman** Urrbrae Agricultural High School Box 227 Echunga 5153	ph 08 272 6955 fax 08 3733043 home 08 3888491
	Colin Raison 66 Park Tce. Gladstone 5473	ph 086 622253

STATE CONTACTS

TAS.	**Alistair Primrose** Sheffield District School Henry St. Sheffield 7310	ph 004 811302 fax 004 911408 home 004 246507
WA.	**Lindsay McNeill** Northam Senior High School Kennedy St. Northam 6401	ph 096 221155 fax 096 225211 home 096 411638

Report on the Australian Institute of Agricultural Science Forum "Education and Training for Agri-Industry".

The Australian Institute of Agricultural Science (AIAS) convened a forum on the theme "Education and Training for Agri-Industry" in response to the realization by many in the agricultural sector that to compete locally, nationally and internationally, Australian agri-industry must have a skilled and knowledgable workforce. I was invited to attend this forum which was held on Thursday 2nd December and Friday 3rd December 1993 in Melbourne and I represented the NSW Association of Agriculture Teachers and the National Association of Agricultural Educators. Both these groups provided me with financial assistance to enable me to attend.

The Forum served as a vehicle for those involved in education and training in agri-industry from all over Australia to meet and work on issues affecting them. Forty nine participants from a wide range of organizations with an interest in education and training in agriculture were represented including universities, TAFEs, rural and industry training councils departments of Ag and primary industries, ag consultants, R&D corporations, farmers' organizations and secondary schools.

The most important outcomes of the Forum were:

1) the recognition of the need for client orientation;

2) the identification of many clients, skill requirements and potential providers;

3) the recognition of the benefit of greater co-operation and co-ordination;

4) a commitment to improve linkages;

5) the requirement for a more effective distribution of information; and

6) the benefit of a collective vision for education and training in agri-industry

From the point of view of secondary agricultural education the major outcome was recognition by many key groups of the existence of education and training in agriculture in secondary schools in all States of Australia!!

Many actions were identified which, if taken, would improve information flow linkages and co-opersation. Improved liason would also decrease duplication and result in better resource use. The results of the Forum are consistent with those expected from the first opportunity for such a wide range of interests to air their views and make a commitment to a better education and training system for all associated with agri-industry.
The Forum went some way to achieving a commitment to co-operative mangement of education andtraining for agri-industrrry.

A Forum to be convened in 1994 will assess progress on the action and consolidate the achievements of the Forum. I believe that it would be in our best interests to ensure that we, as secondary agriculture teachers, are again represented.

Jenni Wilkins
James Ruse Agricultural High School

Report on meeting of the Rural Training Council of NSW

1st February 1994

Introduction

The Rural Training Council of NSW (RTC) is one of 19 Industry Training Advisory Bodies (ITAB's) in NSW. ITAB's are the vehicle through which industry advises government on vocational educational and training needs.
The RTC presents the views of the rural industries in NSW and reports to the Australian National Training Authority (ANTA) through the State Training Agency, the Board of Vocational Education and Training (BVET). It also advises the Rural Training Council of Australia (RTCA) and is consulted by that body in the development of the National Rural Industry Training Plan.

The primary role of the RTC is to determine the training needs of the rural industries, to establish suitable plans to fulfil these needs and in so doing, provide suitable advice to training agencies. It aims to provide advice on planning, policy and resourcing issues in such a way as to ensure the quality of training for the rural industries meets the competency standards required by the industry.

It is funded by operational grants from ANTA and rural industry, principally the NSW Farmers' Association. It is staffed by a full time executive officer, with part time assistance and operates via a representative committee of eighteen which meets 3 to 4 times per year.

Matters Raised

1. State Training Profile

This has been prepared to help in the formulation of future programs. Included is an analysis of NSW Industry Training needs and the Vocational Education and Training needs of Rural Industry. The involvement of secondary schools in vocational educational and training is recognised through their involvement in JSST programs, Industry Studies courses, the establishment of Senior Colleges and the development of alternate pathways to the HSC.
The RTC has applied for funding for an AVC (or Carmichael) pilot program involving secondary schools and Agricultural Colleges and although unsuccessful to date are re-applying for 1994-95 period.

2. ANTA

With the establishment of The Australian National Training Authority, DEET no longer has direct responsibility for the Industry Training Councils. The RTC is now funded by ANTA and reports to it via the State Training Agency which in NSW is known as BVET (Board of Vocational Education and Training). As a result the role of the RTC is being reviewed and expanded with Urban Horticulture and probably Forestry and Water being added to its responsibilities.

3. Traineeships

Poultry and Pig industry trainees are now eligible for Career Start Traineeships and Rural Worker Trainees can also be accepted until more formal procedures have been adopted. Trainees under the CST program receive 75% of Award salary with the employer receiving a subsidy of $1000 to $2000.
A review of rural traineeships in NSW, which was commissioned by the RTC, has been completed by the consultants engaged and a draft of their report was tabled at the meeting. Some changes in the Rural Traineeship scheme can be anticipated as a result of the report.

5. **Wool Industry Training**

Responsibility for accrediting training in shearing, shed hand training and wool classing was the responsibility of the Wool Corporation but this body has now been disbanded with funding expected to cease within the next six months. Quality assurance will probably become an industry responsibility through a system of registration developed by industry and with the RTC being involved in accrediting the training providers.

6. **Articulation**

Articulation of traineeships into certificate and associate diploma courses needs further attention.
A review of the LEAP program is under way at the National level.
TAFE are looking to increase the length of their Farm Technology course from one to two years to develop a Rural Practices Certificate - thus raising the course from an AFS Level 1/2 to an AFS Level 3.

7. **Agricultural Education Co-operative Group**

The NSW Agricultural Teachers Association are to be invited to join this group which currently includes Universities with Agricultural faculties, Agricultural Colleges and TAFE.



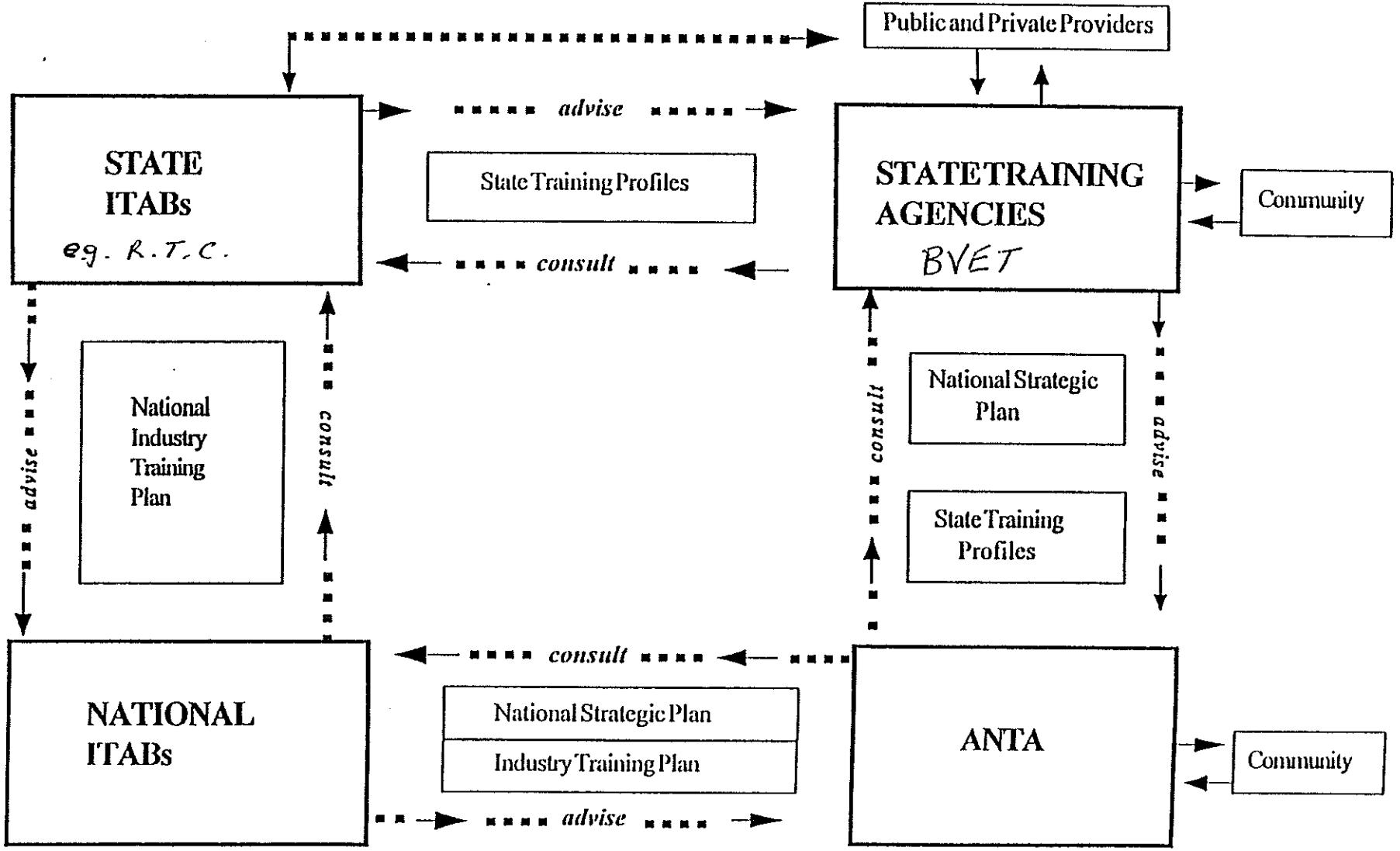
Robert Guest
NSWAAT Representative
Rural Training Council of NSW

Attachments

1. Chart showing organisation of The National Vocational Educational And Training System.

2. A Career Path In Agriculture - an Option

THE NATIONAL VOCATIONAL EDUCATION AND TRAINING SYSTEM



(91)

Responsible to Ministerial Council (Council of Ministers for VET)

A CAREER PATH IN AGRICULTURE - AN OPTION

	ASF LEVEL
RESEARCH HIGHER DEGREES Doctor of Philosophy, Masters and Graduates Diploma	Level 7 + 8 ?
BACHELOR OF AGRICULTURAL SCIENCE 4 year degree course. Admission requirements: University minimum entry requirements, including Chemistry 12CH856C and Mathematics Stage 2 12MT841C (or Mathematics Applied 11/12MT730C). Physics 12PH866C. Physics 12HP866C is desirable but not compulsory. OR successful completion of the Bachelor of Applied Science Agriculture (or Horticulture).	Level 6 ?
BACHELOR OF APPLIED SCIENCE AGRICULTURE (OR HORTICULTURE) 3 year degree course commencing. Admission requirements: University minimum entry requirements, including two subjects from TCE mathematics Stage 2 12MT841C (or Mathematics Applied 11/12MT730C), Chemistry 12CH856C, Biology 12BY836C, Agricultural Science 12AG806C, Physics 12PH866C (or Applied Science - Physical Sciences 11/12SC786C), OR successful completion of the Associate Diploma in Applied Sciences (Agriculture).	Level 5 ?
ASSOCIATE DIPLOMA IN APPLIED SCIENCE (AGRICULTURE) 2 year full-time course or 6-8 years part-time. For middle management training. Minimum entry requirements are: completion of Year 12 with 5 TCE satisfactory achievements including 2 "C" syllabus, and must include the following subjects - Mathematics, one humanities subject, one science subject and one year's full time work on commercial scale; or successful completion of the Farm Apprenticeship. Successful completion of the Associate Diploma can lead to participation in the Bachelor of Applied Science Agriculture (or Horticulture).	Level 4 ?
FARM APPRENTICESHIP A 3 year course of which 8 weeks per year are spent "off-the-job" and the remainder with the employer. A choice of streams is offered ie. grazing, dairy farming, cropping or fruit growing. Minimum entry requirements are: successful completion of the Rural Traineeship, or Higher Achievements in TCE for Maths 421, and English 416, and Satisfactory Achievement for Science 424: or passes in Certificate Vocational Studies - Farming Stream. Successful completion of the Farm Apprenticeship can lead to participation in the Associate Diploma in Applied Science (Agriculture).	Level 3
RURAL TRAINEESHIP A 1 year certified course, of which 13 weeks are spent "off-the-job" and the remainder with the employer. No academic qualifications are required to enter the Rural Traineeship. Successful completion of the Rural Traineeship can lead to participation in the Farm Apprenticeship.	Level 2
JOBTRAIN / SKILLSHARE Provides full-time off-the-job training for the longer-term unemployed. Courses are of 4-12 weeks duration. Courses may lead into the Rural Traineeship.	Level 1

AGRICULTURE CURRICULUM OFFICER The Board of Studies is in the process of appointing an Agriculture Curriculum Officer, who will be, as the advertisement in the Sydney Morning Herald stated, "responsible for curriculum development and support in the area of agriculture education." This is indeed a breakthrough for agriculture and we must recognise with gratitude the assistance provided by the Agricultural Industry through its orgainsations in getting this position created. The NSW Farmers are represented on the Syllabus Committee. The Officer should be functioning by the end of this term.

While the creation of this position is to be applauded I feel the Department of School Education could do more to support its teachers and schools across the state in implementing the new syllabus. You might like to write to the Department and ask what strategies they have put in place to assist in the implementation of the revised syllabus and point out the inadequacy of only one of the eight Regional Curriculum Officers TAS having agricultural expertise.

PROGRESS REPORT ON THE 3 UNIT AGRICUTURE SYLLABUS

Syllabus development is well underway. The format will be similar to the current one with the research project and two electives to be studied out of a selection of eight. There will be no restrictions on which two elecives are chosen. It is hoped that the research project will give further opportunities for research methods other than the scientific aproach to be used by students should they so desire. The eight electives are as follows;

Horticulture
Farm Information Technology
Sustainable Pasture Production
Animal Breeding and Reproduction
Whole Farm Planning
Agribusiness
Alternative Agricultural Systems
Climate - Drought Stategies

Each elective will have built into it a segment where students will be required to develop balanced views and present arguments on a current issue relevant to the elective.

The mechanics of the process are that a writing team of six will meet for two days in March to further develop the material that has been generated at the last two syllabus committee meetings. Their work will be considered by the committee and then forwarded to the Board's Curriculum Committee. The next step is to circulate it to the Consultative Net Work i.e. you people, for comment. It is then back to the Syllabus Committee and then off to the

Board and finally the Minister. The aim is to have this complete by the end of term 2 so that it reaches schools in term 3.

SPECIMEN PAPER The Syllabus Committee has all but completed this task so it should be available in plenty of time before the 1995 HSC.

SUPPORT DOCUMENT A start has been made on this but it will not get much attention until the 3 Unit Syllabus is complete. This is not best practice but it is all that we can do under the circumstances. All of us have other responsibilities in our paid jobs. The new Curriculum Officer will make a difference to the rate of progress.

I wish you all the best for 1994.

Lisle Brown - Chairman Agriculture Studies Syllabus Committee
2/3/94

TERRIGAL HIGH SCHOOL

17 February, 1994

'TREES ON THE HAY PLAINS'

Trees have virtually disappeared from many areas of the Hay Plains, and this process is occurring, or has occurred throughout other areas of Australia. This video is important viewing for all concerned about trees in Rural Australia.

The case study farm, located in the Hay district, has a 30 hectare paddock which has had domestic livestock excluded from its area for the past 45 years. This paddock now boasts a tremendous variety of flora that has virtually disappeared from the surrounding countryside.

The farm owner and a local Greening Australia professional, outline the area's history, the benefits to a property of a similar treed area, and the best way to establish such an area on your property.

The 22 minute video is an ideal supplement to the Junior and Senior Agriculture syllabus, as well as being essential viewing for the "Trees on Farms" topic in the 3 Unit course. This video is also valuable viewing for any related areas of study regarding "Environmental Education."

This video is available from Terrigal High School for just $30.00.

Please send orders to "Ag Department", Terrigal High School,Charles Kay Drive, Terrigal. 2260. FAX 043 852469.

TOTAL P.03

9 Bower St
BRUNSWICK HEADS.2483

OPEN LETTER TO ALL AGRICULTURE TEACHERS

Dear 'Aggies',

1994 ends 40 years of Agriculture Teaching. This has been as a classroom teacher - I haven't chased promotion. Four years at Farrer and thirty six years here, at Mullumbimby High School.

This letter is partly to let the bright, young, enthusiastic teachers of Agriculture know there may be an opening in this beautiful piece of Paradise, from next year. I am retireing.

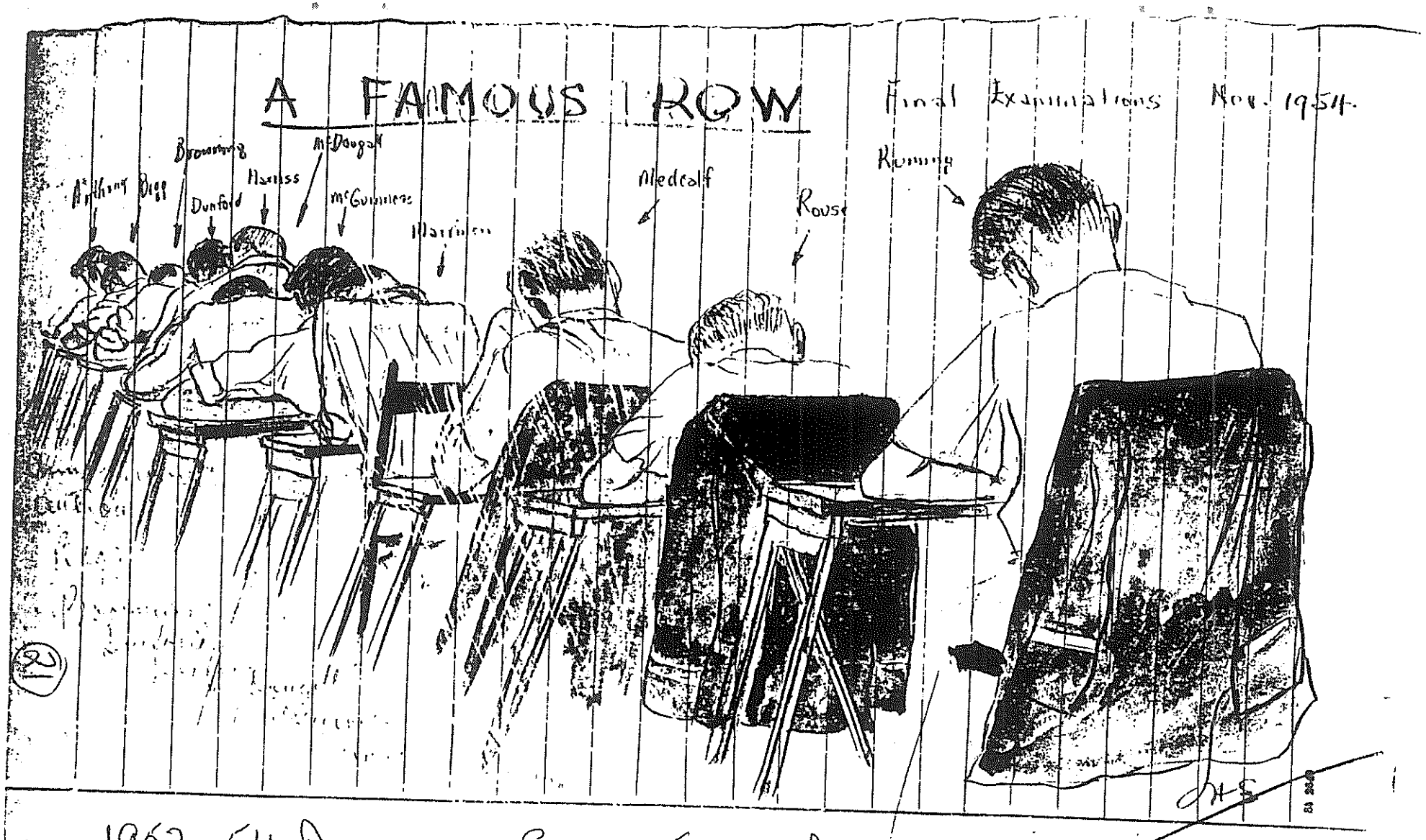
The School 'Demonstration and Experimental Field Laboratory', dedicated to the district Pioneers, is Approx. 1·2 hectares of mainly Red Loam. It was recently reshaped and remodelled, with assistance from Soil Con. . There is a small flock of Farrer origin P.L.G. White Suffolks. Good income from Sugar Cane,Vegetables and Dahlias helps provide developmental money. The P & C are helpful - there is plenty of scope for implementing new ideas. Good backing from the School.

When I began teaching,few graduates were in Agriculture,at schools. Those who were,received rapid promotion and moved out of the classroom. With the new N.E.U. courses, many moved into straight Sciences/other subjects. Even with the Inservice courses and Ag.Teachers Conferences, over the years, I have lost contact with many I knew from college, the 'May Farm' years of Blake, the Armidale conferences of the Buggie/Jones/Mullavey era ,also the North Coast Ag.Teachers Conferences,at many venues. I would like to thank all who have given me help and advice and comradeship over the years.

Enclosed is a photocopy of a sketch I have kept over the years. I hope the Editor can find a page. It is by Jim Sutherland of the 1953-54 Agric.Science intake, at Armidale Teachers College. I trust that all these men, and other Ag.teachers I know, will call in when passing through Brunswick Heads.

Sincerely

Dave Marinon

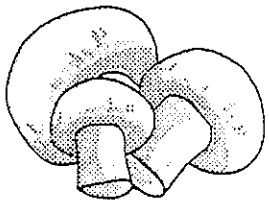


1953-54 Agriculture Science Intake - Armidale Teachers College.

DESIGN AND TECHNOLOGY
YEAR 7
A Teaching Package by Geoffrey Clerke -Part 1

Unit: McMONEY MUSHROOMS

Context: AGRICULTURE



RATIONALE:

Often students lack clear understanding of the continuum of production to consumption of food products and the competition which exists with other food products.

This unit will serve to increase an understanding of the business decisions and technology needed to produce and market a good product which is consumer orientated.

Students will produce mushrooms and use mushrooms to produce a food product. They will research consumer demand and market mushrooms or mushroom food products under their own company logo, at competitive prices.

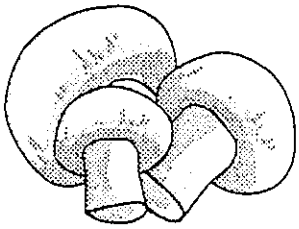
These practical experiences will allow students to start to investigate issues associated with food production, marketing and operating a small business.

ASSESSMENT

Assessment of the process and the outcome will be by:

(a) completing a folio
(b) conducting and analysing on consumer needs for mushrooms
(c) producing of mushrooms at a specified quality
(d) designing, producing and evaluating a brand name, and packaging
(e) developing a simple financial record and a data base of three recipes with a minimum of five fields
(f) using a computer for the data base and a portion of the evaluation report
(g) demonstrating skills of marketing

McMONEY MUSHROOMS: UNIT ORGANISER/PLANNER



Design Situation Agriculture and its technology is the basis for all civilisations. Australia's strength and challenge for the future is to efficiently produce, process and creatively market plant and animal products, associated technologies and services.

Design Brief Design and develop a mini-business to produce and market mushroom products to make a profit.

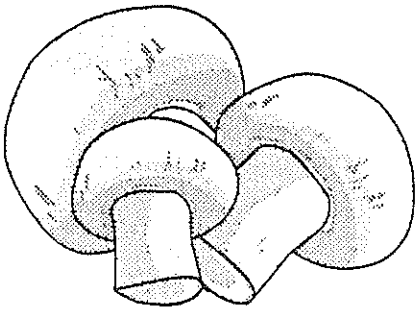
PRESCRIBED DIMENSIONS
RESOURCES

People Family and friends, Teacher, students

Materials Mushroom kit, plastic bag, curtain, paper bags, paper Folio

Tools Computer facility, scissors

Energy	Sun
Time	10 weeks, including computer training. Up to 30 x fifty minute periods
Skills	Using computer for word processing, producing and harvesting mushrooms, beginning entrepreneurial skills simple cash book record
Finance	Cost of kit ($6 - $8) plus plastic and paper bags ($2.00) Students to return $5.00 from sales
Information	Supermarket survey, Recipe books, Worksheet on basic design process, mushroom kit instruction worksheet, safety with mushrooms



DOMAINS

Personal	Leisure activity for urban lifestyle, producing fresh food, sharing in a profit, understanding risk taking
Commercial	Consumer oriented production and marketing techniques
Global	Patents on intellectual property

HUMAN IMPACT

Cultural Issues	Cultural recipes, old myths about mushrooms, other uses
Environmental	Re-using mushroom compost, how a compost works, using and recycling paper packaging
Ethics	Honesty in marketing, fair pricing, sharing work equally
Gender Issues	Do females and males differ in attraction to packaging or type of mushrooms preferred
Historical issues	Who first used mushrooms. How did the aborigines use them?
Motivation	Satisfaction through achievement (growing mushrooms) making a profit
Quality	Surveying to determine quality needs of consumers. Harvesting at the correct time and packaging in suitable manner to prevent spoilage.

UNIT OBJECTIVES

1. To know the meaning of key terms:

Consumer Market Needs	Research	Investigate
Plan of Action	Evaluate	Democratic analysis

2. To express the four stages of the "design" process

3. To be aware of safety issues associated with eating mushrooms

4. To demonstrate simple production and marketing skills through

   (a) growing and selling mushrooms to repay a loan of a mushroom kit
   (b) selling mushrooms or a mushroom product at a profit

5. To design, make and evaluate the experiences of operating a mini-business by:
   (a) Surveying consumer needs and prices for mushrooms
   (b) researching brand names and packaging
   (c) creating new products to meet consumer needs
   (d) deciding on how to recycle the waste products
   (e) cooperatively preparing and sharing a simple group plan of action
   (f) Resolving conflict and using democratic decision making
   (g) Reflecting on progress and results

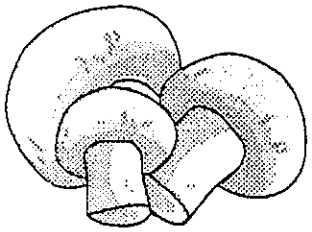
6. To be able to use word processing software on a computer for a simple task

ACTIVITIES LIST
OPTIONAL INTRODUCTORY ACTIVITIES FOR TERM 1

1. TEAM TOWER
2. DESIGN: What is it and how does it affect us?

CORE

STAGE 1 1	1	ANALYSING THE BRIEF
STAGE 2	2	START WITH CONSUMER ; MARKET RESEARCH "Exploring the problem"
	3	DESIGNING A SIMPLE SURVEY
	4	FOOD RESEARCH
	5	TRACKING MUSHROOM PRICES
STAGE 3	6	AVAILABLE RESOURCES CHECKLIST
	7	EXPLORING PRODUCTION REQUIREMENTS
	8	DEFINING THE PLAN OF ACTION
	9	MANAGEMENT DIARY
	10	SUPERMARKET RESEARCH
	11	MEETING A NEED; EATING
	12	MUSHROOMS: NICE TO EAT BUT ARE THEY SAFE?
	13	DESIGN AND MAKE A BRAND NAME/LABEL
	14	REFLECTION ON PATENTS
	15	MATERIAL ANALYSIS
	16	PACKAGING
STAGE 4	17	'MORE McMONEY FROM MUSHROOMS" ASSIGNMENT
	18	EVALUATION REPORT FILE
	19	PERFORMANCE ASSESSMENT



ACTIVITY DETAILS

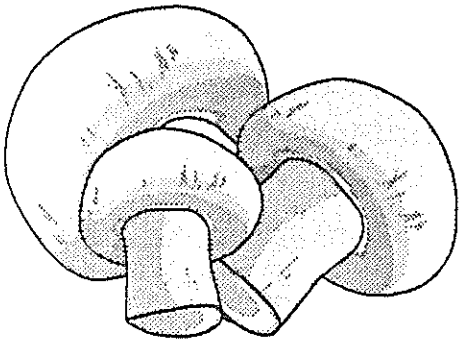
INTRODUCTORY ACTIVITIES:

1. Reflect on a team activity involving the construction of the tallest free-standing structure, using limited resources (pins, straws, paper) and time. Each team gets a mark shared by all members.
2. Visit the Powerhouse museum to explore Design and how it affects us.

CORE ACTIVITIES

3. Identify and use different sources of information, to define the meaning of key words and express the groups goal for this project, in words and pictures.
4. Brainstorm to generate ideas on the kinds of market information needed and examine examples of different methods to collect information. Match method to the kind of information needed.
5. Design a simple survey form on a computer and use it on a target audience, to gather consumer preferences on the type of mushroom they use and why.

6. Research and collect a range of different recipes and uses of mushrooms. Design, use and evaluate a simple database to record and analyse results.
7. Use newspapers and visits to fruit and vegetable shops over a four week period, to investigate, record and present findings on changes in mushroom prices and shop presentation.
8. Complete a checklist to explore the resources needed and to identify resources available with which to produce and sell mushrooms.
9. Brainstorm a series of questions to be researched on mushroom production. Negotiate a loan with each team (including amount to be repaid and timing). Apply this research by correctly setting up and caring for a mushroom kit.
10. Prepare a team plan of action to manage the business using the outline provided.
11. Prepare and keep a diary recording what actually happens. Use the computer, if available to draft and refine entries.
12. Record regularly the cash transactions to enable the team to calculate a profit or loss.
13. Recommend ways to ensure that mushrooms are safe to eat.
14. Select one recipe using mushrooms. Prepare a sample for tasting and evaluation by the class in terms of flavour, smell and visual appeal.
15. Conduct an analysis of brand names and packaging of food in a supermarket.
16. Apply results from analysis to the design and development of a brand name.
17. Discuss and reflect on the role and ethics of patents.
18. Investigate the purpose of packaging and identify its advantages and disadvantages. Question whether the world can afford packaging.
19. Conduct a series of experiments on packaging material to make decisions on the best material for packaging mushrooms.
20. Make a container for mushrooms and test it under a variety of conditions.



21. Research and present ideas using a variety of media, on how people can recycle the mushroom kit materials after mushroom production has finished.
22. Critically reflect on the team's experiences and present a verbal; report to the class for marking.

ALTERNATIVE ACTIVITIES

23. Visit a commercial mushroom grower to discover the cycle of management activities.
24. Design an advertising poster to increase the use of mushrooms.
25. Design and construct a suitable production container to maintain humidity, provide ventilation, stop flies and block light from the mushroom kit.
26. Visit a Japanese restaurant or other talk with people from different cultural backgrounds to investigate the different species of mushrooms that are used.

Many thanks to Geoffrey Clerke for this contribution.

A further instalment will appear in the next edition of ***Designs*** *- Ed.*

October 1993

Dear Colleague,

The brochure **Hydroponics–Years 7&8,9&10 and 11** is for the second teaching resource in the Design and Technology series. In addition to this one I've included another **Introductory Graphics – Year 7** brochure because of its relevance to Year 11 Design and Technology students.

The relevance of **both** these resources to *Years 11 and 12 Design and Technology* students is significant. The drawing course in **Introductory Graphics** is eminently suited to Year 11 students who have not had any background in drawing or design and who would require a "crash" course in the fundamentals of drawing. You wouldn't of course give them the Design Briefs contained in it but the computing course also would be beneficial to the less experienced ones. The comprehensive notes on Design Processes and Design Folios would also be helpful.

I've extended the **Hydroponics** resource to include relevant Design Briefs that address the Systems component of the syllabus. Briefs 4 and 5 are concerned with monitoring and controlling a hydroponic growing system. Brief 4 involves some simple electronics to sense moisture levels and Brief 5 deals with the automatic electrical control and delivery of nutrient solution to the growing system.

The **video** included in the Hydroponics resource has been produced by a New Zealand supplier of Hydroponic systems.

I hope you find these comprehensively resourced teaching programmes helpful.

Yours sincerely,

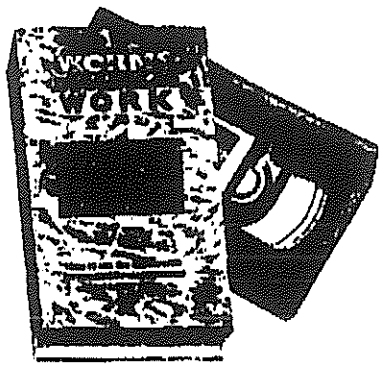
John Bock.

John Bock.

FROM : Dr. Janet Watterson PHONE NO. : 067 66 3144 P01

Courtney a Christo- Schuzza
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WORMS AT WORK



How to use the earthworm for good waste management and better soils

Do you want to know how to turn your food scraps and garden refuse into great new soil four times faster than composting? Do you want to know how to solve your farm's waste problem, and create organic fertiliser for your pasture at the same time?

Then you need Worms at Work ...the video!

For only $39.95 Worms at Work ...the video will show you how to:

• Grow your own worms • Save money by creating your own fertiliser • Have plenty of bait for fishing • Solve your organic waste problems • At home • On the farm • At school • Even at the municipal tip.

Worms at Work ...the video, will show you how to breed earthworms simply, the ideal conditions for worms, the best varieties to use (and where to get them), what worms will eat and how to feed them. We talk to an expert who explains the simple STEP BY STEP guide to setting up your own waste management system.

Worms have the ability to transform organic waste into water soluble, plant usable fertiliser four times faster than composting. Worms will eat anything that was once living! Worm produced fertiliser is 40 times higher in bacteria than animal manure, and worms eat their own weight every day (try doing that yourself!). These worms breed every 7 to 10 days and double their population every couple of months, so you have a rapidly increasing number of worms.

The video, Worms at Work is ideal for:

- **Farmers**
- **Householders**
- **Schools**
- **Municipal tips**
- **Market gardeners**
- **All producers of organic waste**

Produced in 1992.

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FROM : Dr. Janet Watterson PHONE NO. : 067 66 3144 P02

Design & Technology 7–11

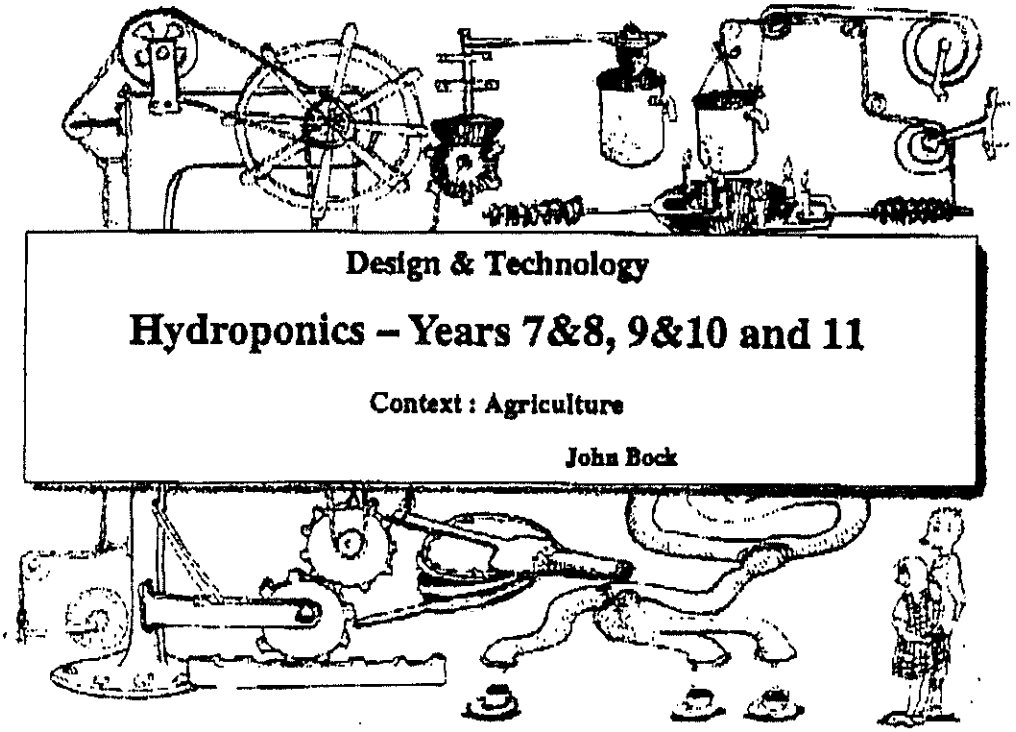
Hydroponics – Years 7&8, 9&10 and 11

Context: Agriculture

- *Over 70 pages of*
- *Teachers' Notes*
- *Six Experiments*
- *Five Design Briefs*
- *Introduces Automatic Electrical Control Systems*
- *One Hour Video on Domestic and Commercial Hydroponics*

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Design & Technology

Hydroponics – Years 7&8, 9&10 and 11

Context : Agriculture

John Bock

Second Title in the Series

A Comprehensively Resourced Teaching Programme!

One Hour Video Included

FROM : Dr. Janet Watterson PHONE NO. : 067 66 3144 P03

AGRICULTURE 2/3 UNIT 1993 MARKING SCHEME

INTRODUCTION

The Agriculture syllabus is based upon a farm case study approach. It is therefore difficult when writing the marking scheme to be specific with the answers to questions which require the candidate to use examples from their own farm case study to answer the question .

For questions where this applies the marking scheme is more general and requires a greater level of judgement on the part of the marker. During the marking process we encourage markers to cross check any examples from candidates of which they are unsure. The pilot marking also requires markers to read a large number of scripts to clarify the depth of treatment required of information candidates are drawing from their own farm case studies. The range of answers in scripts is discussed widely during the pillot marking.

SECTION 1

Question 1

(a) (i) For TWO salable outputs **1 mark**

Possible outputs - eg wheat, wool, lambs, meat, improved pasture,fenceposts, straw, pregnant ewes

(ii) Any TWO purchasable / manageable input including money and knowledge. **1 mark**

NOTE: if the candidate gives ONE correct output and ONE correct input ONE mark may be awarded. Across both parts (i) and (ii)

(iii) Must link (iii) to (ii) by describing how the process changes input to output **2 marks**

an input linked to a process BUT no description **1 mark**

(b) The arrows must be drawn both ways between each subsystem and are awarded **1/2 a mark each** **For a possible total of 3 marks**

There must be a link between ALL 3 subsystems for full marks.

The heads of the arrow are essential, as an arrow is to show direction.

No heads of arrows + 6 labelled lines scored **2 marks**

Each subsystem must be involved.

(c) **1 mark for each change and reason** (seasonal factor must be mentioned eg; temp, rainfall humidity)

Change plus 3 reasons but **no** seasonal factor included **1 mark**
1 reason with a seasonal factor **1 mark**
2 reasons with no seasonal factor **1 mark**

(d) (i) The answer must relate to sheep, pasture or crops not cattle.

Candidates needed to have more than just listed a simple statement eg; plant trees. A simple statement like this gains **1 mark**

More detail outlining problems such as erosion, salinity pH, oestrogenic clovers etc **2 marks**

(ii) simple statement eg. plant trees to decrease the water table **1 mark**

fuller explanation eg higher leaf area will cause increased evaporation rates. Hence a lower water table will result. **2 marks**

restating the problem scored **0 marks**

(e) Any of the following - Gross margin, weight of plant material, budget, stocking rate, and increased animal growth all **1 mark** each

(f) The information must be derived from the farm and must have 2 types for 2 marks. **2 marks**

Question 2

There were **no marks** awarded for naming the **location of the farm, main production subsystems or Name of production subsystem.**

(a) (i) 1. name of a factor eg; high temperature or high humidity **1 mark**
impact on subsystem eg; reduces milk quality. **1 mark**

2. Name of microbe eg staphlococcus or streptococcus (not mastitis or tetanus) **1 mark**
stating impact eg reduced milk quality **1 mark**

3. Name of market factor eg High quality milk, SNF and BF receives higher surplus milk price. **1 mark**
Stating impact eg receives higher surplus milk price. **1 mark**

(ii) **To gain 2 marks For each factor** ie
1. climatic 2. Microbe or invertebrate 3. Market

the candidate must
1. Name the management practice
eg planting shade trees
2. describe how this has modified the factor **Total**
eg reduced stress and increased production **6 Marks**

(b) **No marks** are awarded for **Naming the Plant Production /system.**

Naming appropriate time to start production cycle and correct time scale. **1 mark**

For outlining the entire cycle **1 mark**

For linking TWO procedures **2 marks**
Total 4marks

(A set of appropriate practices in order (no time scale) **1 mark)**

(c)(i) 1 mark awarded if both examples are correct.

For example:
Physical record : yield such as litres/cow/week
Financial record: cost of supplementry feed **1 mark**

(ii) 1 mark for linking physical records to decision
1 mark for linking financial records to decision **2 marks**

(d)(i) 1 mark for naming a new or improved technology or practice not a milking machine **1 mark**

(ii) 1 mark for explaining how the technology is faster, better, easier.

1 mark for linking this to improved efficiency, lower cost, increased profit. **2 marks**

Question 3

Naming a factor does not attract any marks.

(a) Must state a clear objective for the experiment including the influence of that factor on plants. **1 Mark**

(b) Marks awarded on the basis of;

3 MARKS for **design** (either diagram or words) showing 1. treatments 2. control 3. replication 4. randomisation and 5. standardisation **Any 2=1 mark 3 or 4=2 marks all 5 =3 marks**

2 MARKS for **reasons** for design used such as; **1 = 1 mark 2 = 2 marks**

(i) ensuring results are directly attributable to treatments

(ii) ensuring variance is due to treatments.

(c) Clearly outlining TWO observations or measurements eg D.M./ sq m, disease prevalence **2 = 2 marks**

(d) Explain how information is processed.

ie 1 mark for calculating averages, 1 mark for graphing of averages for comparison and/or statistical analysis for significance. **2=2 marks**

(e) Any example of something that would or could improve the experimental design. **1= 1 mark**

SECTION TWO

Question 4

(a)(i) 1 mark for 19-25°C, 19-26°C, 20-25°C, 20-26°C — **1 mark**

For all other answers — **O mark**

(ii) 2 marks for answers detailing effects at low and high levels of water ie 100% of seedlings die at high soil moisture levels, a few% die at low soil moisture — **2 marks**

For answers referring to only **one** level of water and effect. — **1 mark**

(iii) 3 marks for **one** property of clay (eg high water holding capacity) described and related to seedling rot increase. — **3 marks**

3 marks For **two or more** properties of clay similarly related. — **3 marks**

1 or 2 marks for mention of **one** property but NOT related to seedling rot OR mention of reason for rot NOT related to soil property. — **1 or 2 marks**

For repeating question i.e. high clay leads to high rot% — **0 marks**

(iv) 2 marks for explaining WHY (fertiliser affects rot) or mention of specific effects of Nitrogen and Phosphorus fertilisers (information from graph) plus reason. — **2 marks**

For general reference to increasing rot with increasing fertiliser or graph information only — **1 mark**

(v) For mentioning **all four** conditions — **2 marks**
For mentioning **three or two** conditions — **1 mark**
For mentioning **only** one condition (or O) — **0 marks**

(vi) The **practice** must relate to conditions affecting rot eg <u>in Mung Beans</u>. The **reason** must be relevant to practice.

For any acceptable practice **1 mark**

For any acceptable reason **1 mark**

To a maximum of six marks

(b) Must relate legume(rotation) to cereal specifically outlining advantages.

Three reasons **3 marks**
Two reasons **2 marks**
One reason **1 mark**

(c) (i) 1 mark for stating seedling emergence decreases with depth of planting. **1 mark**

(ii) 2 marks for two **reasons** eg nutrient exhaustion, 'toughness' of clay,rot. **2 marks**

For one **reason** **1 mark**

(iii) 2 marks for a rational explanation relating splashing effect on clay---> compaction, puddling, crusting, destroying structure and reducing oxygen levels **2 marks**

1 mark for answer not **clearly** relating above **1 mark**

(iv) 2 marks for explaining that sandy soil does differ in at least one respect eg crusting, compaction. **2 marks**

1 mark for arguing that there was no difference but explaining a valid property of sand/clay **1 mark**

(v) 1 mark for one effect eg erosion, leaching, waterlogging **1 mark**

0 mark for vague answers eg. 'wet soil' **0 marks**

(vi) 3 marks for **two** valid practices **with** descriptions **3 marks**

2 marks for **two** valid practices with **one** description **2 marks**

2 marks for **one** valid practice **with** descriptions — **2 marks**

2 marks for **two** valid practices **without** descriptions — **2 marks**

1 mark for **one** valid practice **without** description — **1 mark**

Question 5

(a) For name of animal enterprise — **0 mark**

(i) For **four** correct outputs — **2 marks**

For **three** or two outputs — **1 mark**

For **one** output — **0 mark**

Note: high quality outputs must reflect the true economic value of the named enterprise.
Relative to the high quality outputs, low quality outputs must be of lower value/quality.

(ii) 1. 2 marks for specific reference to qualities of both pasture and animal/product — **2 marks**

1 mark for general, non-specific answer like "good pastures result in good products" — **1 mark**

2. For an undesirable interaction, the reverse of the above (negative effects) — **2 marks**

(b) (i)

Structure A: For root hair and fibrous root — **1 mark**
For root or tap root — **0 mark**

Structure B: For xylem and phloem, xylem, tracheid — **1mark**
For phloem and / or vascular bundle — **0 mark**

Structure C: For guard cell, stomate, pore — **1 mark**

(ii) For a well reasoned explanation of the role of water in one physiological process eg. photosynthesis — **2 marks**

For an unsupported statement like 'photosynthesis' — **1 mark**

(ii) For answers related to production or processing **1 mark**

For answers related to marketing **0 mark**

(iii) For marketing problem with description **2 marks**

For marketing problem with no description **1 marks**

For irrelevant problem eg. related to production or related to processing **0 marks**

Question 6

(a)(i) The correct phase order is vegetative, floral,seed filling and drying.

For all **four** correctly named **2 marks**

For **two or three** correctly named **1 mark**

For **one** correctly named **0 mark**

(ii) Approximately 120 days from planting to maturity or harvesting, **1 mark**

(iii) To irrigate: EITHER vegetative or floral or seed filling **1 mark**

To control weeds : vegetative **1 mark**

To fertilise: vegetative **1 mark**

(iv) For naming management decision **0 mark**

For **two** reasons or **one reason very well explained** **2 marks**

For **one** reason **1 mark**

(v) For each piece of relevant information eg. amount of rainfall there has been, rate of evapotranspiration, stage of crop growth, soil moisture holding capacity, **one mark to a maximum of two.** **2 marks**

(b)(i) From the data in Table 1, candidates must show that they can understand how to calculate a gross margin
G.M = 2.5 X 100 - (50 + 75 + 35)
= $90 / ha
(must include unit to gain maximum marks) **4 marks**

(ii) For any plausible fixed cost eg. machinery,

depreciation, rates, land tax, permanent labour **1 mark**

N.B where a mixture of fixed and variable costs were listed, no marks were awarded

(iii) For parts 1. and 2:

Name any factor and suitable description eg cost of setting up new enterprise 2 marks

For mentioning factor (eg. cost)only 1 mark

4 marks

(c) (i) For naming any relevant activity **1 mark**

For description of the damage caused (For two types of damage or one fully explained) **2 marks**

(ii) For naming a technology or practice **1 mark**
For a description of how it reduces the effect of the activity **1 mark**

(d) (i) For naming horticultural planting or crop **0 mark**

One method including how it improves yield and quality of named crop or planting OR **two methods** not so well explained **2 marks**

(ii) For the effect of soil temperature well explained
OR
the effect of any soil factor well explained eg. pH, fertility, nutrient status, soil structure (2 marks)

PLUS

the effect of air temperature well explained (2 marks) **total 4 marks**

Question 7

(a) (i) For three separate climatic factors
eg wind, temperature, rain, humidity 1 mark each **3 marks**

(ii) 1. For naming a grazing animal **1 mark**

For a description of how it reduces energy required
eg shelter, trees, windbreak, aspect, coats **1 mark** **2 marks**

2. For naming a housed animal **1 mark**

For a description of how it reduces energy required **total**
eg insulated or heated buildings **1 mark** **2 marks**

(iii) **For parts 1. and 2.:**

Naming a strategy eg hay, silage, sell surplus, agistment,
increasing stocking rate, green manuring,
short term fattening **2 marks**

For showing how it increases farm productivity
eg supplementing seasonal feed shortage,generating **total**
cash flow **2marks** **4 marks**

(iv) For explaining 3 or more reasons **3 marks**

For 2 reasons well explained **3 marks**

An adequate explanation of the above or 2 reasons but
no explanation **2 marks**

Mentioning 1 factor eg low nutrition, low protein **1 mark**

Factors include : high fibre, low protein, low digestability, low palatality.

(b)(i) Age at which the enterprise is biologically most efficient is 5 years.

Answers within the range 4 1/2-5 1/2 years **1 mark**

(ii) Age at which the enterprise is economically most efficient
is 6 years. No other answers were accepted. **1 mark**

(iii) For full marks students could either state;

calculate GM/unit eg ha/animal etc **2 marks**

no per unit basis **1 mark**

economic efficiency as value of outputs/cost of inputs **2 marks**

calculate profit/loss with explanation **2 marks**

no explanation **1 mark**

(iv) Students needed to state a measure of economic efficieny on a comparable basis eg GM/ha for two farm **1 mark**

(v) Biological efficiency is when the animal is converting max / unit. Economic efficiency is when returns become greater than the cost of inputs.

Some reference to above **1 mark**

(vi) Government intervention must refer to inputs and outputs eg price support schemes, sudsidies, tariffs, tax concessions, quotas etc.

1 of the above explained well **3 marks**

Explanation of government intervention + example **3 marks**

Mention 2 of above with good explanation **3 marks**

1 mentioned, good explanation **2 marks**

2 mentioned, no explanation **2 marks**

1 mentioned, poor explanation **1 mark**

)(i) For 1 mark must relate this to the pest or disease named in the box **1 mark**

(ii) 3 marks if just list the strategies eg drench, jet, dip etc.

Marks were given for explanation of integration

Must have at leat 2 different strategies eg cultural, chemical and explanation to gain 6 marks. **6 marks**

uestion 8

)(i) On an individual basis, lower aged animals have lower milk yield/day ie lower productivity. **2 marks**

Age of cow and production level **1 mark**

How productivity increases with age **1 mark**

(ii) On a herd basis: there is a higher % of young animals therefore total production average per day is down. **2 marks**

Comment on productivity and age **1 mark**

(iii) Mastitis - higher count of bacteria in milk, lower quality

Brief reference **1mark**
Several characteristics **2 marks**

(iv) 1 mark allocated for listing factor, 1 mark for description
eg. 1. Feeding- water level, protein level, energy level
2. Time in lactation- calving interval, genetic potential
4 marks

(v) Description of one decision relating to this herd 1 mark
Second decision 1 mark
Well discussed 1 mark **3 marks**

(b)(i) For high butterfat in Jersey milk 1 mark,

futher linked to growth rate increase 1 mark **2 marks**

(ii) Mentioning hybrid vigor 1 mark

Greater growth rate due to hybrid vigor ie combination of desirable genes 1 mark **2 marks**

(iii) Comment on (a) muscle 1 mark
(b) bone 1 mark
(c) fat 1 mark

+ relating to early and late maturing animals **3 marks**

(c)(i) Listing of factor 1 mark

Description of above 1 mark **4 marks**

(d)(i) Comment on change 1 mark

Effect on productivity 1 mark **2 marks**

(ii) Comment on improving productivity by

(a) selection (superior animals etc)
(b) replacement, culling etc)

Single reference on each- 1 mark for (a) and 1 for (b)

Good explanation add an extra mark for (a) and (b) **4 marks**

Question 9

(a) Statement of two management practises
No practises 0 marks **1 mark**

(i)For each practice 1 mark for a clear reason **2 marks**

(ii) For each practise:- statement of a climatic factor 1 mark

How timimg affects this process 1 mark **4 marks**

(b)(i) For each factor:- Naming factor 1 mark

Justification 1 mark **4 marks**

(ii) For each factor a simple explanation of each factor 1 mark **2 marks**

(iii) Simple mention of a technique 1 mark
Inclusion of a good description 1 mark **2 marks**

(c)(i)For each calculation 1 mark (total 2 marks)
Inclusion of units 1 mark **3 marks**

(ii) Comment on a small sample 2 marks
Link to s.d. and mean 1 mark **3 marks**

(iii) 1. Listing correct animal 1 mark
Reasons eg. highest PWG, lowest fat value 1 mark **2 marks**

2. Comment on hybrid vigour and growth rate 2 marks
1 mark for comment that both parents contributed
ie. heritability characteristics **3 marks**

(d)(i)(ii)(iii)
1 for a well explained comment that relates to genetic gain (x3)
Extra mark given overall for very well explained response **4 marks**

SECTION 3 (Essays)

Question 10

(a) Describe changes that have occurred in the market related to processor and consumers in areas of ;

(i) quality - consumer preferences eg lean meat , pesticide free, high protein, fashion, vegetarian, green lobby.
(ii) quantity- changes in red meat vs white meat, new pork and lamb cuts increased sales.

Any change well explained gained a mark to a maximum of 8 **8 marks**

(b) Describe actions that farmers could take to adapt to changing markets, such as ;

Breeding, growth hormones, nutrition management , value adding, grading, selling methods, muscle-frame scores, surveys, consumer preference contract growers, co-operativers, new eqiu[pment, machinery, contracts, pre-selling, increase efficiency methods, diversification, international markets.

Any action explained gains a mark to maximum of 7. **7 marks**

Question 11

Description of ecosystem **2 marks**
Effect of IPM on Ecosystem **2 marks**

Control methods ;
List 3 - 3 marks ie 1 for each control to max 3
example 1 mark **6 marks**
Discussion relating to IPM 2 marks **total**

General concept of economic threshold	1 mark	
Detail of E.T.	1 mark	
Discussion of population equilibrium	1 mark	**5 marks**
Discussion of economic injury level	1 mark	
Relating back to ecosystem and I.P.M.	1 mark	

Question 12

1. Species, age and class of animal

Total of 7 marks allocated - 2 marks for each part
extra mark for quality of answer

species	monogastric / ruminant intensive / extensive
age	protein level related to young energy levels for production maintenance and production
class	sex, reproductive state, lactation, cycling, fattening.

2. Production aims

2 clearly stated aims on the same animal
1 mark each **2 marks**
Discussion of each aim **2 marks**

3. Economics of ration components **3 marks**

Must relate to animals and production aims
Costs of components
Rations related to aims
Substitution of components for cost, nutritive value etc.

Plus 1 mark for quality of answer relating to all 3 sections. **1 mark**

Question 13

(a) 3 marks allocated

1 mark for each method metnioned up to a maximum of 3 methods eg market reports in rural publications, radio T.V., surveys, visiting markets, consumers
OR
2 methods and a good discussion **3 marks**

(b) 6 marks allocated

1 mark for naming each method to a maximum of 3
1 mark for discussing a method to a maximum of 3 **3 marks**

(c) 3 marks allocated.

1 mark for naming a specific marketing problem and 2 marks for a discussion of this problem.

Generalised marketing ideas were given a mark. **3 marks**

(d) 3 marks allocated

1 mark for naming a stategy to counter the problem mentioned in (c).
1 mark for discussion of this strategy
1 mark for a good dsicussion as to how it will counter the effects of the problem mentioned in (c). **3 marks**

Question 14

Part (a) 9 marks allocated

Candidate must refer to the 3 factors specified
3 marks are awarded for each factor;

1. fertiliy at joining ie overfat leads to decreased ovulation decreased conception and decreased implantation rates.

2. birth difficulties ie increased weight of calf leading to dystocia

3. Lactation ie length of lactation, milk composition, quantity of milk leading to increased weight and output.

FOR EACH OF THE ABOVE effect gains 1 mark
explanation 1 mark
specific example 1 mark **9 marks**

Part (b) 6 marks awarded

Manipulating feeding patterns to optimise female production in female animals could refer to refer to production for slaughter or reproduction.

Discussion could include flushing, steaming up, dietry supplements, pasture improvement and feed compostition. These needed to be related to optimising efficiency.

Discussion of what is done = 1 mark
the effect on feeding pattern = 1 mark
an effect on production =1 mark

Marks were awarded as above for 2 examples to give a possible 6 marks total for this question. **6 marks**

Question 15

The productivity of plant production systems depends on the interaction of the genetic make-up of the plant with the environment in which it is grown.

For plant production systems you have studied:

(a) explain how the components of this interaction contribute to production;

		Total
Components of environment and effect on production Genetics and its effect on production	1 mark each at least one of each.	5

(b) using examples, outline the ways in which a plant breeder might improve this interaction;

		Total
Example of breeding objectives Breeding system to achieve it	1 mark each 1 mark each	4

(c) discuss the methods a farmer may use to manipulate the environmental component of this interaction.

		Total
Farmer strategies e.g. Irrigation, fertiliser, plant populations, pesticides	½ for mention extra ½ for discussion	5

(floater)

	Total
Integration of parts One outstanding section Use of relevant diagrams / graphs	1

Question 16

a) **6 marks**

Description of management practices such as;
monoculture, long fallow, over cultivation, incorrect irrigation, clearing, use of chemical fertilisers, overgrazing use of heavy machinery, cultivation on slopes.

If students gave a good description of 3 of these they would gain the full 6 marks. A list of practices without description, would be awarded half marks for each to a maximum of 3.

b) **4 marks**

2 marks are allocated to the mention of effects of practices on the physical nature of soils and another 2 marks on the effect on the chemical nature of soils.

Examiners were looking for effects such as ;

Physical ;	compaction	Chemical ;	salinity
	loss of structure		reduced pH
	reduced infiltration		leaching
	reduced aeration		reduced organic matter
			reduced nutrient availability
			toxicity

A description of 2 physical effects and 2 chemical effects would gain students full marks.

If a student did not gain full marks in Part A but in the examiners view answered Part B very effectively an extra mark in addition to the total mark may be awarded.

c) **5 marks**

The examiners were looking for a good explanation of at least 5 management practices that maintain the soil.

Examiners were looking for explanations of practices such as;
minimum tillage techniques, tree planting, application of lime and/or gypsum, stocking rate decisions, contour ploughing, green manure crops, fertiliser use, irrigaiton practices, use of deep rooted plants, landuse decisions.

1 mark was awarded for the explanation of each management practice to a maximum of 5 marks.

Question 17

(a) For 3 conditions one mark was given for each **3 marks**
These included factors such as;
high level of nutrient, ideal temp. range, stagnant or slow flowing , high levels of light, N:P ratio, faecal content, no control measures.

(b) For 4 problems described 1 mark was given for each. **4 marks**
Problems looked for in the discussion included;
toxin production by algae, decreased oxygen levels, difficulty to erradicate, smell, aestheic impact, leisure activity interupted, detrimental to life in the river.

(c) For 3 activities explained 1 mark was given for each. **3 marks**
Activities looked for in the discussion included;
increase of nutrient levels in waterway after rain, disposal of effluent from intensive systems ie feedlots, removal of vegetation, damming of rivers, excess irrigation.

(d) For 3 well described changes there are 4 marks. **4 marks**
The changes to practices looked for were ;
holding dams, wet lands, change in fertiliser type, on farm treatment of effluent , controlled flow of runoff, restricted pumping from river, government policy re less phosphorus in detergents and feed, education of farmers.

Question 18

a) Discuss the factors which have contributed to depressed rural incomes
Maximum of 7

List factors only :	**2 factors/mark**
Make a point with some clarification	**1 mark**
Make a point with thorough discussion	**2 marks**

b) Using specific examples, describe the recent successful approaches adapted by farm managers to improve farm incomes.

List examples only	**2 examples/mark**
Make a point and discuss with an example	**2 marks**
Make a point and discuss	**1 mark**

Floater for a) or b) = **1 mark**
awarded for exceptional coverage of part a) or part b)
and/or
well presented and argued.

3 UNIT AGRICULTURE

The marking of 3 unit essays involves the application of the set marking scheme. Additional to this is consideration of the overall impression of the essay. Some marking schemes specify this in their marking scale. However for all essays examiners may add an additional mark for an essay which shows clarity, organisation and impressive layout.

GROUP A ELECTIVES

A1 SOIL MANAGEMENT

(a) Part (i) 8 marks

For 2 fertilisers needed to discuss name, the use and method of application. **4 marks**

For 2 chemicals needed to discuss name, use and method of application. **4 marks**

Part (ii) 6 marks

Name and discuss how each input from part (i) affected soils 1 mark for each affect or 2 for a more detailed discussion.

Three inputs (must have been both a fertiliser and chemical included) in total had to be discussed for a possible 6 marks. **6 marks**

Part (iii) 6 marks

Name and discuss 3 management options and explain how they affected the soil. (for 2 marks each)

OR

1 option and a very detailed discussion relating back to the effect on the soil gained 3 marks. **6 marks**

b) (i) Students need to list a farming system - no marks

Acidification	Salinity
fertilizers overuse	tree removal
increase organic matter	using saline irrigation water
increase legume growth	over irrigation rising water table
reduced lime	
leaching	

3 points to be mentioned
2 marks for each point if well explained
1 mark for each if partial explanation

6 marks

Acidification	Salinity
liming	drainage
plant plants that take up N	plant trees
effective use of acidic fert.	careful irrigation
use non acidic fertilizers	reduce stock access, fence
	no fallow
	fertilizing to increase plant growth
	deep ripping
	gypsum
	mulching

3 points to be mentioned
2 marks for a full explanation
1 mark for a poor explanation

2 floating marks available for specific details

8 marks

Options could include

economics $	topography
ignorance of problems	soil type
poor technique	poor advice from reps.
Total Catchment Management	location of farm

Need to list 3 factors (either way)
1 mark for a full explanation
2 marks for a full explanation

6 marks

A2 IRRIGATION SYSTEMS

(a) For 5 marks candidate needed to discuss previous exploitation. **5 marks**

For 5 marks needed to link the future of irrigation to the exploitation described above. **5 marks**

For 4 marks discuss environmental conflicts **4 marks**

3 marks for discussing flood mitigation conflicts **3 marks**

3 marks for urban meter demand conflicts. **3 marks**

(b)(i) One mark for each reason for the increase in pasture production relating to the different irrigation systems **5 marks**

(ii) Two marks for each factor other than plant productivity and a description **10 marks**

GROUP B ELECTIVES

B1 HORTICULTURE

(a) (i) Reasons for diversity;

climate, soils, natural diversity, multicultural society, location, transport, changing lifestyles.

Point(1 mark), discussion (1 mark) * 3 factors **6 marks**

(ii) Developments;

Transport improvement, genetic imporvement, plant variety rights, controlled environments (temp, water, grwoing medium) higher mechanisation vs labour, hydroponics, cheaper technology, more functional. **7 marks**

(iii) Importance of Marketing;

Targeting marketts, special occassion, overseas markets, advertisement, generation of markets. **7 marks**

(b) (i) Discussion of a product or a number of products generated. A detailed discussion is necessary for **4 marks**

(ii)Consumer demand;

Discussion of management	1 mark for point made 1 mark for discussion	**4 marks**
Marketing strategies	as above	**4 marks**

NOTE both must ne mentioned for 8 marks, however a 6/2 split acceptable.

(iii) Future Prospects;

4 marks for future products (2 points + discussion)
4 marks for future developments(2 points + discussion) **8 marks**

B2 RESEARCHING CURRENT ISSUES IN AGRICULTURE

(a) This question asks candidates about issues they have studied. Therefore it is necessary to read the marking allocation in conjunction with the question to apply the marking scale.

(i) 5 marks for issues well explained and balanced **5 marks**

(ii) 10 marks for discussion of research needed or carried out. **10 marks**

(iii) 5 marks for final solutions / opinion and justifiactions with examples. **5 marks**

(b)	(i) 10 marks -	5 marks selection / outline of issue	**5 marks**
		5 marks non biased suport ie showing a balanced view.	**5 marks**
	(ii) 10 marks	5 marks presentation of methods	**5 marks**
		5 marks for personal view.	**5 marks**

GROUP C ELECTIVES

C1 ALTERNATIVE ANIMAL PRODUCTION

(a) Marks were allocatd in the following areas . There were also 2 floating marks for new and relevant points.

(i) Major changes to and existing animal production system **6 marks**

examiners were looking for changes in feeding patterns , housing, husbandry techniques, fences, pests and diseases, breeding programs, type of animal .

(ii) How changes met market demands. **6 marks**
Examiners were looking for reference to changing market demands, prices, production costs, overseas market pressure, population size, nationality changes, farmers soci-economic state, financial security.

(iii) Economic viability. **6 marks**

Examiners were looking for cost and price of inoputs and outputs, forecast and partial budgets, market trends, dgeree of difficulty of type of production.

(b) Marks were awarded under the headings;

1.Naming of an alternative system and justifying reason or advantage. **3 marks**
2.Listing establishment of management techniques and comparing to; **4 marks**

3. the adapted or new method techniques **4 marks**

4. problems and advantages of the various techniques or product and, **5 marks**

5. explaining how expertise may be sought. **4 marks.**

C2 REPRODUCTION, BREEDING, AND PRODUCTIVITY IN ANIMAL PRODUCTION SYSTEMS.

(a) (i)Candidates needed to address;

-that reproductive performance has low heritability rating. **4 marks**
-that reproductive performance rates lower than production
-characteristics which are lower again than qualitative characteristics (eg horns / coat colour).
-An explanation of the fact that selection on the basis of reproductive performance can lead to ;

decrease in productive performance
low improvement between generations

This can be in the form of graphical representations or examples like the Coopworth. **4 marks**

(ii)The syllabus indicates that ALL candidates should be capable of discussing 5 factors (in detail) that would effect reproductive performance.

Therefore marks were awarded on the basis of 12 marks for 5 well discussed factors or 6 not discussed in as much detail.

Just naming a factor scored no marks. **12 marks**

(b) (i) Outlining the techniques of artificial insemination and oestrous synchronisation.

Candidates were required to show advanced knowledge of the collection , dilution , management and process of artificial insemination.

Candidates needed to explain the operations associated with Oestrous Synchronisation particularly the action of the hormones as well as the mechanisms for introducing the hormones. **8 marks**

(ii)Candidates were expected to develop a breeding program and discuss the management strategies for the implementation of the breeding program.

Candidates needed to discuss likely outcomes of the breeding program such as improved genetic pool and breeding towards improvement of production characteristics.
Discussion of management steps needed to include timing of practices

and reason for them, the feeding and nutritional status of the animals and the generation intervals that the program produced.

7 marks

Finally candidates were expected to relate their program to their expected outcomes. **3 marks**

2 marks were allocated for expansion or exceptional responses. **2 marks**

GROUP D ELECTIVES

D1 BENEFICIAL MICROBIAL CHANGE

(a) (i) 3 marks for describing each process. Must outline 3 steps **6 marks**

(ii) 2 marks for stating aim of experiment
4 marks for describing methodology
3 marks for describing results **9 marks**

(iii) 5 marks for discussing at least 4 factors affecting microbial activity.
3 marks for 2 factors well described
1 mark for 1 factor. **5 marks**

(b) (i) Up to 4 marks for each of 2 processes - for full 4 marks candidate must show how modification has occurred and the process caused by the microbe to bring about that modification. **8 marks**

(ii) 8 marks for description of an experiment -
4 marks for description
2 marks for showing effect of environmental change on rate of microbial activity. **6 marks**

(iii) 6 marks for linking to part (ii) by drawing out the factors which generally influence the rate and efficiency of microbial activity. **6 marks**

D2 DISEASE

(a) 8 marks allocated to section (i)

1 mark for the disease triangle (either graphic or explanatory) **1 mark**
ie

Host

ENVIRONMENT PATHOGEN

1 mark for each description of an interaction / process between the above ie host -----> environment, host -------> pathogen, pathogen <----> environment up to 6 marks. **6 marks**

In their discussions candidates should include examples of ;

host factors such as natural immunity / resistance eg Bos indicus to cattle tick, legumes to root rots.

environmental factors such as high humidity encouraging fungi such as phytopthora, poor hygeine in the dairy encourages growth of staph/ strep leading to mastitus.

pathogen eg black leg bacteria able to survive in soil for many years, fruit fly able to overseason in fallen fruit, rust species overseason on volunteer plants eg black oats.

1 mark for explanation of infectious , metabolic or genetic disease. **1 mark**

(ii) 10 marks for this section.

5 marks for examples of reduction and encouragement of the processes of animal disease and 5 marks for examples of this in relation to plant disease. To achieve 5 marks for a section the candidate had to discuss several examples in great detail or cover a wide range of strategies in less detail. **10 marks**

Candidates are required to present specific examples describing how the farm manager could reduce disease incidence and encourage beneficial processes.

Examples for each are outlined below.

Plants Biocides, traps containing hormones Nutrition, increased resistance, rotation, Removal, quarantine, tissue culture, selective breeding.

Animals Vaccination, drenching, dipping, traps for flies, nutrition, rotation, removal, quarantine, selective breeding.

There were 2 floater marks to be awarded for structure, balance, (between plants and animals) and logical sequence.

Marks were not removed for not discussing part (i) and (ii) separately or for mixing examples of animals and plants.

(b) (i) Explaining the immunity mechanism in plants

3 aspects required each with a detailed explanation or 6 aspects listed. **6 marks**

Explaining the immunity mechanism in animals

3 aspects each with a detailed explanation or 6 aspects listed. **6 marks**

(ii) How the breeding program increases immunity **3 marks**

Role of vaccination in animals **3 marks**

If one section was discussed in detail 1 more mark was allocated. If the 2 sections contained detail then 2 extra marks were given.

GROUP E ELECTIVES

E1 INTERNATIONAL MARKETING OF AUSTRALIAN AGRICULTURAL COMMODITIES.

(a) (i)7 marks awarded for a discussion of the relative importance of the international and domestic markets to Australian producers of agricultural products.

Candidates must mention the importance of 2 products, their international and domestic market shares , high labour costs and the effect of isolation on the products. **7 marks**

(ii) 5 marks awarded for the influence of Australian Agricultural production in world trade with emphasis on Australia as a 'price trader' with little influence. **5 marks**

(iii)8 marks awarded for the influence of barriers or agreements on Australain Agricultural Production where candidates must mention GATT, NAFTA, Cairns group, EEP, Asian economic relations and describe their affects on Australian Agricultural marketing. Tarriffs , embargoes and quotas also needed to be included.

(b) (i)10 marks awarded for discussing the difficulties faced by Australia Agricultural producers in the trading environment dominated by Europe, USA and Japan in terms of tariff protection, enhancement programs, bi-lateral arrangements, market share and influence, geographic isolation and E.E.C. restrictions. **10 marks**

(ii) 10 marks for discussing future opportunities through tariff reductions (GATT), Cairns group of seven, bi-lateral trade agreement between Australia and N.Z., achieving tariff reductions in USA and Europe, reduction of marketing barriers in S.E. Asian countries in particular Japan and Korea, production of quality products to suit particular markets, importance of increased market research and development in overseas countries. **10 marks**

E2 COMPUTERS IN AGRICULTURE

(a) (i) 10 marks for outlining the use of computers on farms. Each use must include and explanation of how the computer fits into and effects the whole farm system. (this may be done generally or using specific examples)

10 marks

(ii) 10 marks for expanding from (i) to illusrate how improvement and change can be brought about on the farm through using computers in the ways suggested above. **10 marks**

(b) (i) 2 marks awarded for discussing the nature of the software
2 marks awarded for discussing the tasks it can perform

4 marks

(ii) Discussion of the value of the software

1. monitoring
2. planning
3. record keeping
4. decision making

4 marks each

16 marks

GROUP F ELECTIVES

F1 GENETIC CHANGE AND AGRICULTURAL PRODUCTION

(a) (i) 10 marks for explaining the biological basis of breeding techniques - examples must be included from the techniques metnioned in the question.

10 marks

(ii) 10 marks for outlining the impact of such techniques on either a plant or animal breeding program. This section of the essay must give detailed examples to show a clear understanding of the impacts . **10 marks**

(b) (i) 10 marks awarded for a discussion of the contribution of breakthroughs in genetic engineering including examples such as;

disease resistance, improved growth rates, transgenic animals, inserting segments of DNA to improve wool yields and finess, new breeds and determination of sex.

Candidates needed to show the contribution of these breakthroughs to agricultural systems to achieve the full 10 marks. **10 marks**

(ii) 10 marks were awarded for this part for outlining the potential benefits and problems associated with genetic engineering such as ;

moral issues ('have we gone too far?) , cost, chance of mutation increased, homozygosity (too many plants of the same gentic make-up could be destroyed by disease), shrinking gene pool, increased genetic gain from superior animals, disease tolerance.

Examiners were looking for a detailed discussion of these problems and benefits where the candidate showed an understanding of the impact of these within agriculture.

F2 TREES ON FARMS.

(a) 5 marks allocated for discussing the establishment of a whole farm plan and relating it to existing landuse. **5 marks**

(i) 5 marks awarded for discussing the role of trees including;

- advantages of trees on farms
- specific situations and how trees can be used in this situation. **5 marks**

(ii) 5 marks were awarded for discussing the selection of tree species including their suitability eg climate , salinity, windbreaks, erosion etc and the names and descriptions of species. **5 marks**

(iii) 5 marks awarded for discussion of establishment , proliferation and maintenance. These included ;

1. establishment through seeds, seedlings, natural regeneration.
2. seed collection and propagation.

3. maintenance by watering, pruning, tree gaurds, pest control and fencing. **5 marks**

(b) (i)3 marks were awarded for discussing the implementation of the tree programme.
1/2 mark each up to 3 marks **3 marks**

4 marks for discussion of reasons.
(1 mark each reason) **4 marks**

(ii)4 marks for describing establishment techniques,
(method and why =1 or very well described for 2) **4 marks**

Discussion of maintenance techniques
(4 methods and why or 2 very good) **4 marks**

Costs 2 marks **2 marks**

(iii)3 marks for outlining long term benefits of the program
(1 mark for each) **3 marks**

A LOOK AT THE AGRICULTURAL SECTION AT TWEEED RIVER HIGH SCHOOL

Tweed River High was established as the " top " high school in NSW in 1962, being transferred from a central school at Tweed Heads. The schools population rose slowly to 1500 in 1985 (the largest in the state), when it was split into two schools, the second established at Kingscliff. The school population is now fluctuating at just over 1000 pupils and 60 staff.

Agriculture has always been part of the elective curriculum in both junior and senior years. Numbers have fluctuated with the school population since 1985 with 348 pupils electing Agriculture to only 46 in 1994.

With a choice of only one elective in Year 8 and three electives in Years 9 and 10, from a choice of thirteen electives. Pupils doing Agriculture have fallen into to one elective class in each year and numbers in each year vary between 15 - 25 pupils.

STAFF

Staff teaching agriculture have always been part of the Science Department and have varied in number from five to two. Current teachers are G Liddell and I O'Connell.

THE SCHOOL FARM

The School farm is located within the school grounds less than 50 metres from the teaching rooms and occupies an area of 1.8 hectares. This area has been slowly recovered from the extensive sporting field surrounding the school.

The farm is located on wallum sandy soil of extreme low fertility and poor water holding capacity. The soil has no structure and a high pH. This is excellent for pupil cultivation that can be carried out at anytime as our climate allows for plant growth all year round.

The farm consists of a number of small paddocks sown to subtropical grasses, mainly setaria. Lucerne has been established recently with correction of the soil pH from five to six by many years of high application of dolomite annually - approximately one tonne per hectare. Pastures are oversown in April/May with ryegrass and clover for winter/spring grazing. Sugarcane is grown in one area as a source of bulk food for cattle.

The main cultivation is pupil vegetable plots for all junior years. A selection of vegetables are grown from March to November.

Irrigation is from town water supply using monsoon sprinklers up to six at a times. This is beginning to cause a problem with cost of water, (thanks to Globle Budgeting) and the great need of water on the sandy soil.

SHEEP

For the last fifteen years a small flock of fine wooled Merino sheep (twelve, now reduced to four), have been bred at the school. Rams have been given to us by various Northern Tableland producers (the Moores of Glen Innes have donated two rams over the past fifteen years). Half the Merino flock is mated to a Border Leicester ram to breed X bred ewes for fat lamb production. Fat lamb sires began with Poll Dorset Horns then Suffolk and Southdowns. The sheep operation is changing to a non registered Southdown Stud used for local show competition. Sheep are a major component of the farm activity as they provide a large range of activities for pupil participation.

THE PIGGERY

A pregnant backfatter is purchased each year and a litter farrowed. The sow's litter which is raised to one hundred kilograms live weight is sold to a local butcher. Our piggery was built by the local Lions Club. This year we are purchasing a new farrow and plan to help reduce losses from piglets being laid on.

CATTLE

The size of the farm only allows one cow to be run. Its offspring conceived by A.I. is raised as a vealer. We have a Murray Greay commercial cow purchased from Grafton High as a weaner.

POULTRY

The poultry unit has a deep litter pen and battery cases for egg production. Pullet chickens are raised each year by eight/nine and grown to layers. Eggs are sold to staff. Numbers are kept to about forty hens.

APIARY

Bees always create an interest to pupils even if it is only to count the stings. Six to Ten hives are kept and it is a good practical class for students. Honey production is fairly poor.

As in all schools agriculture is feeling the pinch from the wide elective line offered and numbers are falling and cost of maintaining agriculture slowly climbs. It is a growing dilemma. We have just lost the use of our home room due to the expanding muscle of an aggressive Math department. This with a six hundred dollars allocation of Global Budget funds forces the Science department to carry Agriculture. Our yearly expenditure is approximately five thousand dollars with an income of about three thousand five hundred to four thousand. Wool is sold to primac in Brisbane and local spinner and weavers. Cattle fat, lambs and pigs are sold to local Butcher. Pupil fee of nine dollars covers their purchase of vegetables.

The following is a list of practical activities carried out on the School Farm.

YEAR 9 AGRICULTURAL PROGRAMME

1.Introduction -Record booklets
Sociogram to establish pupal work groups
-Farm map
-Safety exercise
-School enterprises
-Monthly observations records

2 .Farm Orientation and movement of sheep through yards

3. Allocation of small individual plots and vegetable plots

4. Issue of garden tools for maintenance care
a] sand paper and paint handles with linseed oil
b] repair to heads

5. Soil examination
test for - texture
- structure
- water holding capacity
- ph.

6. Preparation of a potting mix for seedlings and sow - lettuce
-cabbage
- broccoli
- cauliflower
- capscium
- tomatoes
exercise involves thinning out and pricking out to larger pots

7. Use of garden immplements and preparation of plots, chipping hoe, fork, spade/shovel, rake,cultivator.

8. Sow in small plots - lucerne, clover, soyabean, inoculate and lime pellet.
- maize.
- garlic

9. Identification of fertilizers and project collection

10. Farm machinery safety

11. Training on parts of and driving of Gem rotary hoe

12. Training on parts and driving of tractors

13. Spread compost and manure on vegetable plots

14. Sread dolomite and fertilizers on plots, treat with humic acid and rotary hoe in

15. Garden video

16. Prepare vegetable bed - fork, mound for drainage,and rake

17. Sow vegetables and transplant seedlings

18. Care of vegetables - weed
-sidedress
- hill
- thin-out

19. Name parts of a hive and equipment needed to work bees

20. Build and wax aframe and refoundation old frames

21. Ingroups build and paint a bee super

22. Raise a group of chickens in a brooder

23. Set up and hatch chicken

24. Correct handling of poultry, parts of a fowl and types of feathers

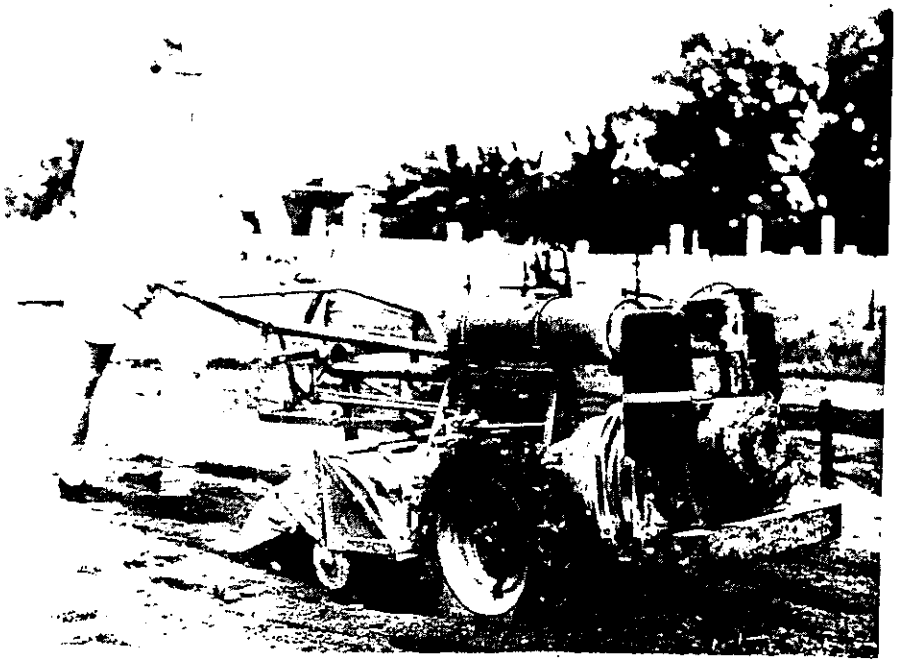
25. Care of poultry unit

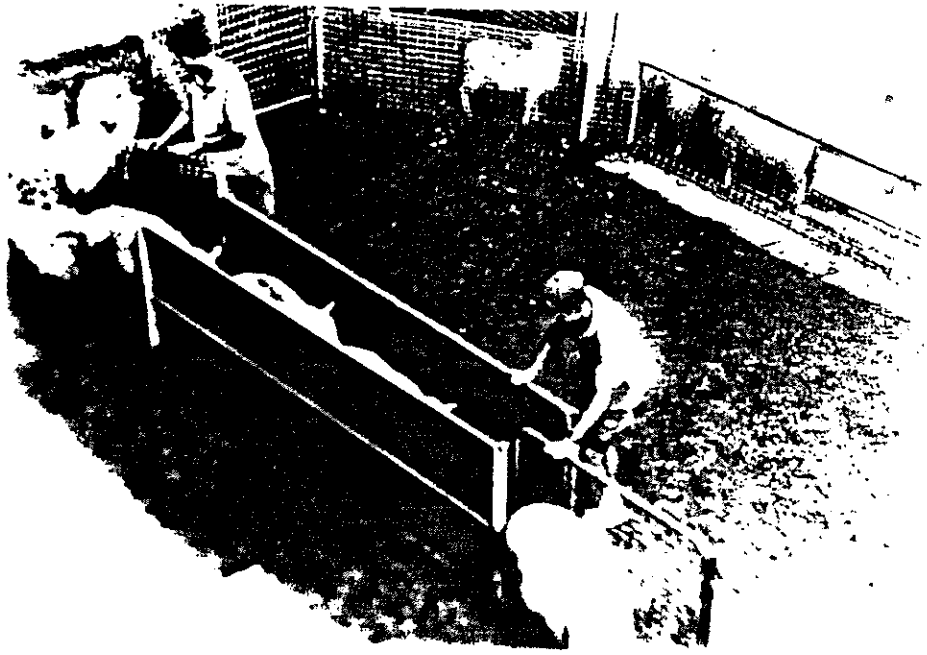
27. Mix poultry feed - Project on animal feeds
28. Weather map unit
29. Pot a Chrysanthum sucker
30. Plant a dalhia and gladioli in sample plot
31. Repot a palm and fertilize
32. Exercise on lighting a smoker
33. Rob bee hives
34. Extract honey
35. Bottle and sell honey
36. Farm knots - clove hitch
    - sheet bend
    - tying a hay knot
    - quick release knots
    -bowline
    -truck load knot
    - crown knot
    - back splice
    - eye splice
    - make a sheep or cow halter
37. Make a weed and pasture collection

AGRICULTURE YEAR 10 PROGRAMME

1. Set up monthly measurements -weather
    - pasture growth
    - sheep weights
    - management of pigs and weights
    - sample crops
    - sheep operations
2. Handling of sheep.
3. Drenching sheep - training with water
4. Crutching of sheep and paring hooves.
5. Mating sellection of sheep
6. Raddling of rams and mating groups, record matings and use of breeding tables.
7. Judging the weight of sheep.
8. Fat lamb carcase evaluation.
9. Post mortum of a sheep.
10. Examination of hives.
11. Robbing of hives.
12. Extraction and sale of honey.
13. Roling of green manure crop.
14. Rotary hoe green manure crop.
15. Preparation ofvegetable area - compost
    - humic acid
    - seedlings
16 Sow vegetable crops
17. Sowing of pastures,lime pelleting, rolling and discing
18. Spread Autumn fertilizer.
19. Care of sow.
20. Carcase evaluation of sow.
21. Mix sow feed.
22. Sow in sample area -winter cearals
    - sunflowers
    - peas
23. Farrowing procedure.
24. Set bees for winter.

25. Vacinate all sheep.
26. Crutch and par sheep prior to lambing.
27. Tick control of canal.
28. Project on soil conservation.
29. Cattle - drenching
    - hand feeding with sugar cane and silage.
    - use of head stall
    - buffalo fly control
    - A.I.
    - leading training
30. Show preparation of sheep.
31. Shearing of sheep, skirting, classing and fleece evalation.
32. Sheep conformation.
33. Crop sample collection project.
34. Land preparation for green manure crops - deep ripping
    - spreading dolomite
    - rotary hoe
    - rolling
    - humic acid spray
    - discing
35. Sheep behaviour.







STATEMENT ON SUSTAINABILITY

Following the endorsement by the State and Federal Governments of the National Strategy for Ecologically Sustainable Development (ESD), the Minister for Primary Industries and Energy has requested that ESD-related R&D be specifically reported in the Annual Report.

Sustainability in Northern Australia



Research into sustainable beef production in northern Australia has been proceeding for several decades. This work has concentrated on retaining the viability of the native grass-dominant pastures while maximising beef productivity.

Several recent technologies have placed enormous pressure on the sustainability of these native pastures. The introduction of the drought-tolerant Bos indicus breed, increased usage of protein and phosphorus supplements and the introduction of tropical legumes have led to an increase in survival rates and herd size. As a result there has been an increase in grazing pressure.

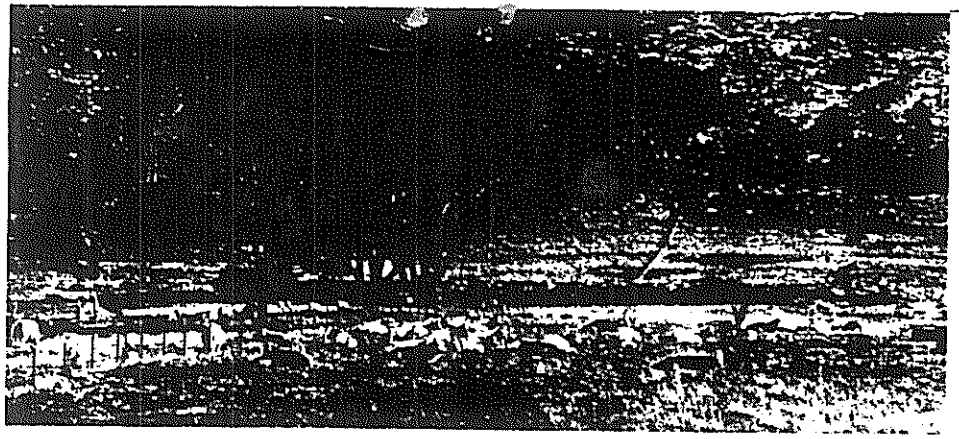


Pasture degradation is greatest following major climatic events such as severe droughts. As a result, sustainability projects within the North Australia Program have concentrated on aligning safe stocking rates with annual pasture condition.

Work is continuing at recognising the different transitional states of northern pastures and the factors such as intense grazing pressure or uneven grazing patterns which cause degradation to occur. Results from this work will enable producers to utilise improved management techniques to transfer land from a non-viable to a sustainable and viable state.

The MRC is presently funding a range of projects within the sustainability area. These include:

- Identification of sustainable grazing strategies throughout Queensland, the Northern Territory and Western Australia.



- The control of woody weeds through improved management.
- The use of biological control agents.

Results from these projects are to be combined into whole property management packages and transferred to industry through the use of producer groups.

Sustainability in Southern Australia

Over the last 12 months MRC has been active in developing the Temperate Pastures Sustainability Key Program which focuses on the impact grazing management has on pastures. The aim is to maintain pastures within a "pasture management envelope" that has a proportion of legumes and perennial grasses which will maintain a sustainable and productive pasture in the long term.

An important component of this is understanding the impact of grazing management on sustainability. The MRC has joined with the Land & Water Resources R&D Corporation and the Wool R&D Corporation to fund two sustainability sites, one in northern NSW and one further south. These sites will involve researchers from a number of research organisations including departments of agriculture, divisions of the CSIRO and universities.

As well as investigating nutrient and water flows and their impact on acidity and salinity, the program will be developing sustainability indicators that can be validated at the regional grazing management sites. There are 19 of these sites established on farms throughout the high rainfall zone in NSW, Victoria, SA and Tasmania.

The collaboration of three Rural Industry Research Corporations and a number of research organisations provides an opportunity to get the best minds in Australia together and concentrated on the issue of the sustainability of the temperate pasture resource base in the high rainfall zones. Many producers are finding that their improved pastures are not persisting beyond 7 to 10 years and today there are few who can afford to resow. This Program is looking to develop grazing management recommendations that all producers can use. To ensure that this happens, producer groups such as Grassland Societies are involved with all regional grazing management sites.

Biological control

The Corporation presently funds biological control projects on weeds, pests and insects including Scotch and Illyrian thistles, Paterson's Curse, fireweed, dock, Heliotrope, St John's wort, rabbits, red legged earth mite and lucerne flea. Many of these projects are jointly funded with other external funding bodies, in particular the Wool R&D Corporation.

In the long term all these projects aim to develop environmentally "safe" solutions. In the short term, however, researchers are working hard evaluating insects and diseases which have been rarely studied in the past. Much of the biological control work is high risk, long term and with uncertain outcomes as far as effectively controlling pests. It is now becoming apparent that, with pasture weeds for example, the biological control agents will not totally eliminate these weeds. At best they will suppress them.

Therefore biological control needs to be considered as part of a program of pasture improvement. While in the long term biological control will give Australian producers a cost advantage, the benefits should not be oversold too early.

Environmental Management

There has been an increase in the number of projects dealing with environmental issues. These projects encompass research into odour and waste water management of feedlots, meatworks and tanneries. Environmental projects in the grazing industry centred on managing kangaroos and the production of clean meat, free of chemical residues.

STATEMENT ON ENERGY EFFICIENCY

The Corporation supports the enhanced energy management program announced by the Federal Government in October 1990 and the guidelines announced in the Prime Minister's Environment Statement in December 1992

The guidelines call for improved energy efficency in relation to vehicles, equipment and building design. The Corporation leases offices in a large building complex and does not own large energy using equipment or commercial vehicles.

ERYSIPELAS in Pigs

Erysipelas is a bacterial disease that can infect a wide range of animals - including man, sheep, birds and pigs. It can cause significant production losses in pigs, poultry and sheep although the pig population remains its largest problem area. The sources of loss include death of livestock, abortions, ill-thrift and rejection of carcasses at abattoirs.

(*Remember, slow growth and chronic illness can cause greater economic loss than occasional deaths.)

Because the causative organism can survive for long periods under some conditions, and the risk of infection from carrier pigs remains constant, a continuing program of preventative vaccination is recommended. In instances where vaccination programs have faltered, significant and costly erysipelas outbreaks have followed. The cost of erysipelas to the Australian pig industry has been put as high as $500,000 in carcase condemnations alone.

Causative Organisms:

Erysipelas is caused by the bacteria *Erysipelas rhusiopathiae.* The bacteria exists as a large number of serotypes; within each serotype, organisms will vary considerably in their ability to produce disease. In Australia swine erysipelas is generally caused by serotypes 1 and 2 of *E. rhusiopathiae.*

Symptoms

Erysipelas occurs in three forms, differentiated by clinical symptoms.

Acute Erysipelas:

Pigs suffer sever illness and fever (40°C+), lethargy, depressed appetite and the skin may become discoloured or reddened to some degree - the ears and underline may become 'purple'. Vomiting, diarrhoea and discharges from the eyes may occur. Sows may abort. A large number of pigs may die within days.

Sub-acute Erysipelas:

Similar symptoms to acute erysipelas may occur although they will be milder. Characteristic diamond-shaped red blotches appear on the skin, mainly about the abdomen. The blotches may fade and the pigs recover although in some cases wounds that are slow to heal may result. The disease is sometimes known as "Diamond Skin Disease".

Chronic Erysipelas

This is Australia's most common form of erysipelas. it usually involves arthritis affecting the knee, elbow, stifle, hock and hip joints; loss results from lameness, ill-thrift and carcase condemnation at abattoirs. Exercise or physical exertion can result in breathlessness, coughing and a blue-purple skin colour; pigs may die when stressed by transport or excessive handling. Piglets born to infected sows may be weak or dead at birth. Heart disease with growths on heart valves may be involved.

Not all pigs exposed to Erysipelas rhusiopathiae become infected. Some infected pigs will show no obvious symptoms; these 'carrier' pigs can be a continuous source of infection for the rest of the herd.

Diagnosis

Symptoms similar to those of erysipelas infection - fever, skin lesions, arthritis and heart failure, are also common to a number of other diseases. Therefore veterinary assistance, laboratory tests and bacteriological examination of diseased pigs and blood tests are required for confident diagnosis.

Treatment

Pigs suffering from the arthritic form of erysipelas are regarded as incurable.

Acutely ill pigs may be treated by various antibiotic injections; this may save the pig's life but the infection may persist. Consult your veterinarian before treatment.

Isolate affected animals. Burn carcases and disinfect the area of the infected pigs' previous accommodation using caustic soda or hypochlorite solutions.

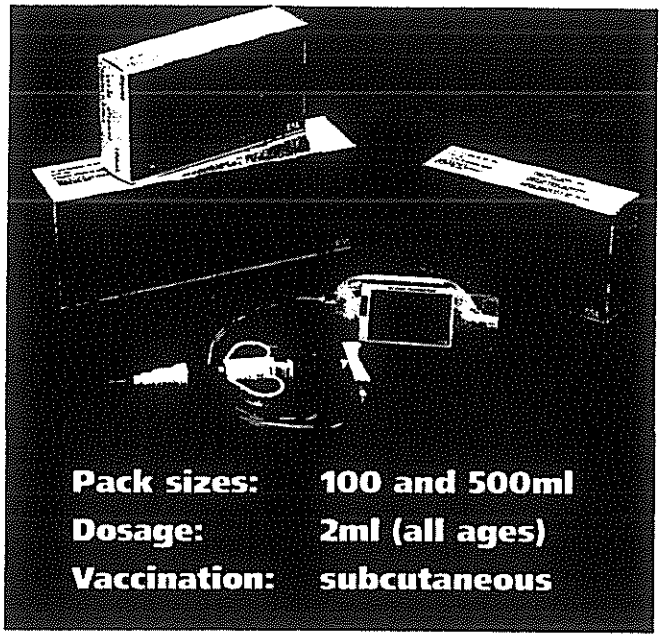
Human Infection

Human contact with acutely affected pigs or pig carcases can result in a painful local skin condition described as ersipeloid. It appears as an enlarging red or purplish swollen area which has a well defined margin and a clearing centre. The disease is rarely serious or life-threatening although in these instances symptoms can include generalised skin infection, septicaemia and heart disease.

Prevention

Complete eradication of erysipelas is considered impractical due to the large number of 'carrier' pigs and other species including birds and rodents. The causative organism may also survive indefinitely in certain environments.

Eryvac



An effective vaccination program can maintain a high level of herd immunity.

Vaccination

Routine preventative vaccination:
To maintain a high level of herd immunity, breeding sows should be given a booster injection before every farrowing. If not previously vaccinated, sows should also be vaccinated at mating. This regime will protect piglets during their first weeks of life.
Piglets are then vaccinated at weaning and again 4 to 6 weeks later. Boars should be given 6-monthly booster injections.

When an outbreak occurs:
Proper vaccination will control erysipelas. When initiating a vaccination program the whole herd should be vaccinated with each animal receiving two injections with a 4 to 6 week interval between them. The piglets subsequently arriving should be injected at weaning and a second dose 4 to 6 weeks later; this will protect pigs until marketing age

The ideal time for booster vaccination against erysipelas is pre-farrowing. Where management practices demand a satisfactory simultaneous vaccination against erysipelas and leptospirosis, this will provide satisfactory immunity. This may be achieved by vaccinating:

- each sow prior to mating
- each sow prior to farrowing, or
- the whole herd at regular 6 monthly intervals

Where 2 separate vaccines are used, each vaccine should be injected at different sites. The best site to inject pigs is under the skin just behind the ear.

Consult your veterinarian for optional vaccination programs or before varying existing vaccination programs.

To assist in reducing the handling and stress on pigs, a vaccination program using CSL's Lepto-Eryvac vaccine can be adopted. The 2.5ml dose ensures protection against both leptospirosis and erysipelas in the one injection. Lepto-Eryvac vaccine is available in 50, 100 and 500ml packs.



If erysipelas infection is suspected, contact your veterinarian for advice on diagnosis and control. Routine vaccination is the best available means of controlling erysipelas and your veterinarian can recommend a suitable program.

Experience that counts
Vaccines that work.

CSL

CSL LIMITED ACN 051 588 348
45 POPLAR, PARKVILLE VICTORIA 3052 AUSTRALIA
Phone: (03) 389 1782 Fax: (03) 389 1646 Telex AA32789

Let Murrumbidgee College provide accommodation for your school excursion to the Riverina

The College

Murrumbidgee College of Agriculture is an educational branch of NSW Agriculture, located at Yanco Agricultural Institute on the edge of the Murrumbidgee Irrigation Area.

The College is situated on an 825 hectare irrigation and dryland property and is fortunate to share resources with research and advisory activities in rice, horticulture, animal and crop production.

Yanco and surrounding areas provide many and varied educational opportunities for geography, agriculture, social studies and science students. Such students can study a range of ecosystems, food and agriculture, interactions between agriculture and biophysical sciences, linkages between farming and food processing or technological changes in agriculture - while fulfilling school course requirements for practical and field work.

Facilities

All meals are provided and accommodation is in college style study bedrooms with access to recreation rooms equipped with TV and video recorders. Students should bring their own sleeping bags and towels.

Our spacious and well presented grounds present an ideal setting for your school visit. Recreational facilities include a swimming pool, tennis, basketball and volleyball courts, a cricket pitch and large ovals.

The college has special accommodation for up to 50 school pupils. For each group of 20 pupils, one teacher will be accommodated at no extra charge and coach driver accommodation is also free.

Areas for study

* River systems - ecosystems, prior streams, unique redgum forests.
* Natural parkland ecosystems
* Intensive/extensive agriculture
* Water catchment usage
* Irrigation - furrow, trickle, sprinkler
* Rice growing
* Vineyards/winemaking
* Horticulture
* Mixed farming
* Local industry tours
* Animal husbandry
* Research facilities
* Inland fisheries
* Variety of soil types
* Salinity problems
* Farm technology
* Catchment management

Local industries that offer guided tours include : Letona Cannery, Sunwhite Rice Mill, Quelch Juice Factory and Toorak and Lillypilly wineries. Sheep milk cheese is made locally at Tavella Cheese.







Murrumbidgee College of Agriculture
Yanco. NSW 2703 Tel: (069) 53 0299
Fax: (069) 53 0268

SCHOOL EXCURSION COST SHEET (GUIDELINES ONLY)

Accommodation only

1 night and 3 meals	_____	$25.00

Optional services

Organisation of itinerary and tour guide	_____	$225.00 per day

More pupils mean cheaper tours

For example:		For one day	2 days
20 pupils:	accommodation	$25.00	$50.00
	tour	$11.25	$22.50
	total cost per pupil	$36.25	$72.50

1 teacher and coach driver at no extra charge. Linen supplied.

		For one day	2 days
40 pupils:	accommodation	$25.00	$50.00
	tour	$6.00	$12.00
	total cost per pupil	$31.00	$62.00

2 teachers and coach driver at no extra cost.
Linen supplied for teachers and coach driver.

To discuss cost details and needs of your excursion please contact the Principal's Secretary on (069) 53 0299

NSW Agriculture

UNE
The University of
NEW ENGLAND

Facilities at the University of New England's Field Laboratory, "Newholme", are available for use by schools and other educational establishments.

Newholme has been managed for teaching and research by the University's School of Natural Resources for two decades. Multiple land use is a central tenet of the Laboratory's mission. Conservation of the natural ecosystems on the property in conjunction with the commercial agricultural enterprises provides a broad range of opportunities for research, teaching and extension in natural resources, i.e. soils, hydrology, native pastures, forests, wildlife and wildland recreation.

Newholme is situated 10 km north of Armidale and covers about 2000 hectares. The property operates commercial sheep, beef cattle and deer enterprises and incorporates both Dumaresq Dam and Mount Duval - a State Forest managed by the University as a reserve. These features provide much of the habitat for the abundant wildlife found on the property. Newholme supports 3 macropod and 6 arboreal mammals, and over 80 bird species.

Pastures on Newholme comprise a mixture of native and introduced species, and relatively low stocking rates allow natural regeneration of native trees. Soils are underlain by the New England Batholith (specifically Mount Duval adamellite), and commonly have duplex or course-textured gradational profiles. Soil erosion is a problem on the property.

Newholme offers a wide range of opportunities for field classes, including participation by University researchers and full technical support. Office facilities, including computer hardware, a well-equipped classroom and bunkhouse style accommodation for up to 24 persons are available. Catering arrangements can be tailored to your needs. A more detailed summary of infrastructure, natural resources and research interests is attached.

Prices start at $75/half day for use of seminar facilities, with costs in the region of $40/person/day for fully catered overnight accommodation. Five-night/6-day courses cost around $400 per person all inclusive; 2-night/3-day courses cost around $195 per person, depending on level of Newholme staff involvement required.



Enquiries should be directed to Tessa Lock,
Newholme,
Dept. Ecosystem Management,
University of New England,
Armidale, NSW 2351.
Telephone (067) 71 1212 (bh)
or 71 1886 (ah).

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Newholme Field Laboratory

Newholme Field Laboratory

ACCOMMODATION

24 beds (6 bedrooms) - bedding supplied
a/c power in all rooms
3 showers
3 toilets
3 washbasins
bathtowels optional @ $3 per person

CATERING

kitchen (all crockery and cutlerly, electric stove, microwave oven, fridges, freezer)
BBQ and picnic tables

TEACHING FACILITIES

well-equipped classroom (seats up to 30)
audio-visual equipment supplied with prior notice
2 computer terminals, incorporating a GIS for the property
colour printer
telephone
fax
field glasses
spotlights
identification manuals (birds, plants)
4WD transport (necessary for Mount Duval)
historic homestead and farm buildings
meteorological station
seismic recording station
Dept. Water Resources stream gauge

SUGGESTED TEACHING TOPICS

This is by no means an exhaustive list, but aims to indicate our areas of expertise which may be of interest.

a) agricultural production issues

beef production
wool production
venison production
soil erosion
dryland salinity
New England dieback
trees on farms
native pastures
whole farm planning
grassland ecosystems
weed control

b) other natural resource issues

wildlife management
vertebrate pest control
conservation of biodiversity
environmental impact assessment
natural resources legislation
fire ecology
visitor management in natural areas
forestry
natural and disturbed ecosystems
woodland ecosystems
interrelationships between biological, physical and economic environments
habitat fragmentation

Please don't hesitate to contact us for more detailed information (including flora and fauna species lists), or to discuss any specific activities or topics you would like to include in your visit.

Classes staying at Newholme are conveniently placed to make use of neighbouring University properties which are managed according to more traditional primary production goals. Daytrips to rainforest and dry sclerophyll forest and woodland National Parks are possible additions to your itinerary.

*The Following is An Extract From A Paper "From Wye to Wherefore: A trail of Enquiry into Agricultural and Resource Economics"

Professional Reading

By J. Brian Harraker

Public Lecture U.N.E. Armidale

Sustainability of Rural Production

One deficiency of most farm-household economic analysis is that it is set in a static framework, when the reality changes over time. Thinking about future changes in the farming systems almost anywhere in the world quickly raises questions about sustainability. When sustainability first came into prominence, I had some difficulty in grappling with it. Sustainability is hard to define, at least for an economist. Conventional economic theory really doesn't accommodate it. But seeing the effects of population growth in many of the overseas places where I have worked brought the concept home to me. Most of the South Pacific Islands, and much of upland South-East Asia, relies on farming systems based on shifting cultivation. These systems are inherently unsustainable in the face of growing population pressure on the land.

The all too conspicuous trends towards resource degradation that I have seen in these areas raise what is surely the most pressing question of our time. How is the human race to survive on a diminishing and degrading resource base if population continues to grow? So, I began to think about the development of sustainable farming systems. At first, I saw this as a technical problem. I used to believe that all that was needed was enough agricultural research, salted with a small dose of socioeconomic analysis, and the answers would be found. I related this to a recent study I did of some agroforestry trials in Fiji. In the ginger growing areas in the hills of Viti Levu north-west of Suva farmers are cropping sloping land with soil erosion running at between 100 and 300 t/ha per year. At these rates, the farming system has a life expectancy of 5 to 15 years. Although it is still early days, the introduced agroforestry system being tested is showing promise, so all that is needed, I thought, is to apply the same methods to develop other sustainable systems suited to other areas.

But then I began to think about how many agroecosystems there are in Fiji, and in the world, and about how much research effort would be needed to develop sustainable technologies for each. And I realised how much time it would take to do the socioeconomic analysis of all the prospective sustainable farming systems that might be proposed. It would be obvious to Blind Freddie that such an approach won't work. It would take too long to do all the research and socioeconomic analysis and, in the meantime, many rural resources will be degraded or lost altogether, placing still more stress on what remains. Clearly, we need a quicker solution. Where is it to be found?

A Conversion on the Road to Damascus

The answer to the puzzle of how to develop improved sustainable farming systems with the speed and on the scale needed was staring me in the face, yet I had to have it pointed out to me by my colleague Tin Hta Nu. It is necessary to mobilise the rural people themselves. They must be empowered to take control of their own futures and of the futures of their descendants.

Rural people are usually very good resource managers. Most farming areas have been farmed for hundreds, perhaps thousands of years. For example, at Kuk in the highlands of Papua New Guinea I was shown evidence of a drainage or irrigation system that was perhaps 9000 years old, making it one of the earliest systems of food cultivation anywhere in the world. The land at Kuk is still farmed today, so there must exist in the local community vast accumulated wisdom on how to farm in a sustainable way. Contrast the short history of farming by European settlers here in Australia with those 9000 years of agriculture at Kuk, or, indeed, with the 30 000 years or more that Aboriginal people have lived off this land.

If rural people are degrading their resources, then clearly something has gone wrong. Perhaps they are unaware of what they are doing. Some resource degradation is slow and not too conspicuous, so perhaps they don't notice it. Or perhaps old systems of control have broken down and new ones have not been created to replace them. For example, in India the management of what they call tanks and we would call dams used to be mainly in the hands of local princes. After independence, elected councils replaced the rule of the princes, but these have lacked the authority to make people toe the line, and many tanks have become derelict or operate at low efficiency.

Of course, sometimes, resource degradation is the result of plain greed or plain poverty, both of which can be equally damaging. Certainly, the unbridled growth of population, combined with growing aspirations and the consequent spread of cash cropping, can be disastrous for sustainable production.

A Suggested Prescription

Here, then, is my prescription. The responsibility for care of rural resources must be given to the rural people themselves, who must also be empowered to be able to accept that responsibility. They must first become aware of the importance of managing their resources properly. That is a question of education and, while not simple, is surely possible. Attitudes and values must be changed, if necessary by mobilising all the power of the modern advertising industry. In particular, attitudes to population growth must change. Social scientists should help design and introduce appropriate community-based programs to raise consciousness and to motivate people to take control of their own futures.

Second, knowledge-intensive inputs from scientists should be combined with the considerable fund of technical knowledge of the people themselves to identify at least tentative solutions. These knowledge inputs naturally need to be backed as solidly as possible with experimental work, but experimentation is difficult, expensive and slow. Some experiments can be done by the people themselves, in their own situations. Farmer-run trials are more likely to be relevant to the local situation than experiments on some distant research station, and so are more likely to lead to adoption.

Third, the solutions proposed initially will be tentative 'best guesses' in most cases. They will need to be applied in an adaptive way, with monitoring and feedback. Monitoring should also combine modern and local skills. So, satellite imaging may give information on, say, land use, soil erosion or crop health, that can be interpreted for the locals to use. But also, people themselves can be encouraged to adopt 'appropriate' monitoring methods, such as simple ways of measuring the rate of soil loss.

Fourth, institutional and policy changes will often be needed. If there is market failure, so that resource users are being given the wrong price incentives about how to use resources, ways to overcome such failure need to be found. New institutions may be required, or existing ones may need to be changed.

The Role of Economics and Economists

I used to believe that every resource management problem is really an economic one. After all, economics is the science that studies the allocation of scarce resources among competing ends. However, I have come to realise that neoclassical economics does not have all the answers and that we economists need to become much more modest about what we can contribute to better agricultural and resource management.

Part of the trouble is that neoclassical economists have deceived themselves. By making a number of strong and rather unrealistic assumptions about the nature of reality, they have been able to construct an internally consistent and intellectually seductive theory of economic behaviour. This theory is certainly quite powerful, but it is only an abstraction. The real world is not like the abstract world of theory, and economists get into trouble when they come to believe that it is, or should be.

One of the assumptions that economists often make is that of perfect knowledge. In other words, it is assumed that all players in the economic system know everything about the existing and future situations. Clearly, that is wrong, and relaxing that had been a catch-cry in farm management in the developed countries, was misleading in the developing country context where farms and households are usually so closely entwined. Drawing on the systems thinking mentioned earlier, I began to see the smallholder system as an integration of farm and household economies. The same idea had occurred to others, and a new and influential theory of farm-household economics began to be popular.

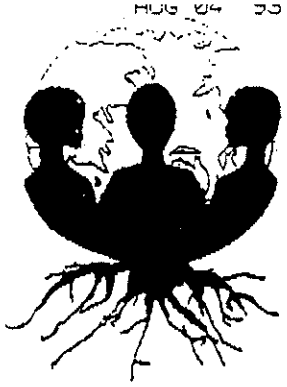
Two main approaches have been followed to making farm-household economic theory work in practice. Most studies have used econometric estimation. I supervised one such study of rice farming households in Java by Mas Soedjono for his MEc degree. Others, including myself, and my former PhD students such as Julie Delforce, also working in Tonga, and, more recently, John Dixon, working in Nepal, have used linear programming models.

With the benefit of hindsight, I am inclined now to view this quantitative modelling work as something of a dead end. The models have all been rather large and complex, so have been difficult to construct and apply. They have consumed a vast amount of data, that have been expensive and time-consuming to collect. They have certainly given some insights, but on reflection it seems to me that these have come as much from the construction of the models as from their use. In other words, I now see systems analysis as more insightful than systems design. Understanding is what is valuable, not numerical answers.

Nowadays I would still try to build models, but would emphasise their use to conceptualise the world, rather than to analyse it in a quantitative way. I would want to broaden the scope of the models to embrace more dimensions of the real systems. And I would be much more interested in the perceptions of reality that other students of these systems would have, most notably, those of the people living there. There have been some interesting studies getting rural people to describe their world in their own terms. These descriptions are often very informative. For example, the models that women build are often quite different from those that men construct of the same system.

SUSTAINABILITY?

* If interested in paper in its entirity, contact the Editor.



Around the Nation Around the World

WOMEN IN AGRICULTURE

Australia invites you to participate in the
Inaugural
1994 INTERNATIONAL CONFERENCE
to be held at Melbourne University
on 1st to 3rd July 1994
The theme of the conference will be
" Women in Agriculture - Farming For Our Future "

The program will cover sustainable development, production, economics, environment and the role of women in each of these areas.

As a participant you and/or your organisation will hear and learn about these topics from national and international keynote speakers, workshops, panel and round-table discussions, formal and informal networking and international forums. Pre and post-conference farm tours will also be available.

This will be your opportunity to participate in an international forum addressing current concerns in agriculture by intergrating the experience, knowledge and skills of women in agriculture from around the world developing networks for future discussion, communication and action on national and international agricultural issues.

The conference is convened in recognition of the role of women in agriculture globally now and in the future.

● **To express your interest please return the portion below:-**

Name: .....

Address: .....

.....

Telephone: ..... Facsimile: .....

Area of interest, *e.g.* ☐ Women in Agriculture ☐ Environment ☐ Production

● **Please send to:** Networking Co-ordinator, Women in Agriculture,
Department of Conservation & Natural Resources,
7 Service Street,
BAIRNSDALE 3875, VICTORIA, AUSTRALIA.

Telephone: [051] 52 0400 *Facsimile:* [051] 52 0444

BITS AND PIECES

CONFERENCE TIME AGAIN...

Your attention is drawn to the Women in Agriculture conference to be held soon. A flier is included in this edition. A report from anyone who attends would be appreciated for future editions of B.A.A.T.

PIGGING OUT.....

Don't be concerned about sending off to the Australian Pork Corporation for some class sets of their 3 new booklets for school students. Not only useful for Agriculture classes but also very appropriate for Design and Technology classes particularly with briefs that extend into nutritional/home ec type work. And best of all they are absolutely free. Some information has been included and the address to send to is P.O. BOX 307, ST LEONARDS Or simply send a fax as I did to 02 438 3913.

NATIONAL FARM SKILLS TRAINING GUIDE.

Agriculture teachers that I have shown a copy of this document to have been very glad to hear of the existence of such a document.

In a subject where we have always emphasised the attainment of certain skills by our students, it is nice to know that with very little modification we can make these skills very relevant to the rural industry.

This combined with competency levels and the new outcomes based syllabus documents make this guide an excellent resource for any agriculture department. Not only for the skill level of our students but also for any farm staff that may wish to improve skill levels. In fact it may become an important tool, should enterprise agreements be introduced for farm staff .

The N.S.W. Department of Agriculture already has used this guide to produce a competency base for all of its farm staff employees.

The guide is now available on disc to suit I.B.M. compat. computers. This is available from the Rural Training Council and any enquires can be made through the N.S.W.A.A.T's rep on that committee, Bob Guest at Farrer.

I have included a printout of a quick simulation to show the type of information available from the package. It has hundreds of different competencies and levels for numerous industries. So why not formalise what you've probably been doing for years.

EXCURSION VENUES:

I was lucky enough to visit U.N.E.'s "Newholme" farm just north of Armidale toward the end of 1993. They have appointed a full time education officer and run residential excursions for any type of program you wish. The costs and some information have been included however it is well worth further investigation as I feel the pricing may well be negotiable. It fits perfectly with the Sustainability emphasis of the new Senior Syllabus, and also provides students with the opportunity to assist with "real" research programs and to observe a commercial deer farm in operation.

Geoff Creek at Murrumbidgee College Of Agriculture has once again displayed his entrepreneurial skills, with the offering of school excursion programs at the college. A range of enterprises at the college and a diverse range of equipment is sure to provide students with an action packed few days.

* Refer 'Bits + Pieces' for BACKGROUND INFO.

NATIONAL FARM SKILLS DISK

A "WORKED EXAMPLE"

By A. Hemmings

(A) MAIN MENU ON SCREEN

(B) SELECT AREA OF INTEREST. (IN THIS CASE 10 IRRIGATION.)

(C) THIS IS PRINTOUT FOR ALL COMPETENCIES THAT RELATE TO ANY ENTERPRISE/WORK AREA CONCERNING IRRIGATION

(D) THEN SELECTED IN THIS EXAMPLE "400/1986" FRUIT GROWING OBTAINED INFORMATION ON THIS COMPETENCY

(E) SHOWS THE PERFORMANCE REQUIRED

(F) SHOWS THE CONDITIONS GIVEN

(G) SHOWS THE COMPETENCY LEVELS TO REACH.

THE LIST OF COMPETENCIES IS ENDLESS!!

SearchMAGIC 7.2: Database Selection Menu NATIONAL FARM SKILLS-00

NATIONAL FARM SKILLS TRAINING GUIDE

HELP

SearchMAGIC: NFSTG Keyword index: AREA (Field 1 of 4)

27	DAIRY
7	DECISION
14	DEER
2	DOGS
10	DRAINAGE
3	EXPLOSIVES
7	FARM
11	FENCING
8	FIRE
1	FIREARMS
21	FODDER
29	FORESTRY
18	FRUIT
32	GOAT
10	GRAIN
18	GROWING
10	HANDLING
8	HORSES
32	HUSBANDRY
10	IRRIGATION

A

B

Subject(s): _____

Subject(s): _____

Job number: _____

move, Ins paste, Del undo, A-Z jump, Y search, F1 help, Esc quit

SearchMAGIC 7.2: NFSIG 21 records found

593/1986	BERRY PRODUCTION	OPERATE A WATER BUDGET FOR STRAWBERRIES
583/1986	BERRY PRODUCTION	APPLY LIQUID FERTILISER TO STRAWBERRIES
814/1989	WILDFLOWERS	INSTALL A WILDFLOWER MICRO IRRIGATION
499/1986	IRRIGATION	FLOOD IRRIGATE USING AN AUTOMATIC
502/1986	IRRIGATION	LAY A BELOW GROUND IRRIGATION MAINLINE PIPE
501/1986	IRRIGATION	MAINTAIN A BORDER-DYKE IRRIGATION SYSTEM
500/1986	IRRIGATION	MAINTAIN A MAINLINE IRRIGATION SYSTEM
497/1986	IRRIGATION	SPRAY IRRIGATE USING A BIG GUN IRRIGATION
498/1986	IRRIGATION	SPRAY IRRIGATE USING A CENTRE POINT
493/1986	IRRIGATION	SPRAY IRRIGATE USING A HANDSHIFT SPRAYLINE
496/1986	IRRIGATION	SPRAY IRRIGATE USING A TRAVELLING
494/1986	IRRIGATION	SPRAY IRRIGATE USING AN END TOW IRRIGATION
818/1989	WILDFLOWERS	MAINTAIN A MICRO SPRINKLER IRRIGATION
592/1986	BERRY PRODUCTION	MAINTAIN A STANDING OUT AREA IRRIGATION
815/1989	WILDFLOWERS	MONITOR A MICRO IRRIGATION SYSTEM
588/1986	BERRY PRODUCTION	OPERATE AND MAINTAIN A TRICKLE IRRIGATION
400/1986	FRUIT GROWING	SERVICE AND MAINTAIN A SPRAY IRRIGATION
495/1986	IRRIGATION	SPRAY IRRIGATE USING A SIDERAIL SPRAYLINE
567/1986	VEGETABLE PRODUCTION	ASSESS THE WATER REQUIREMENTS OF A
518/1986	VEGETABLE PRODUCTION	PLANT POTATOES USING A NEEDLE PLANTER

Subject(s): IRRIGATION

Subject(s):

Job number:

PgUp PgDn Home End Y move, + expand, - remove, Esc quit

ID NO : 400/1986
AREA : FRUIT GROWING
JOB : SERVICE AND MAINTAIN A SPRAY IRRIGATION SYSTEM

PERFORMANCE : You will be required to:

(a) Maintain a spray irrigation system

CONDITIONS : Given

(a) Spray irrigation system (undertree or overhead)
(b) Water source (eg river, reservoir, bore, etc.)
(c) Pump
(d) Sprinkler line
(e) Sprinkler heads
(f) Necessary tools
(g) Pump and engine oils
(h) Advice as required
(i) Opportunity to practise the operation
(j) Opportunity to monitor the longer term outcomes

STANDARDS : You will demonstrate competency by:

(a) Ensuring the system is capable of an immediate start when required
(b) Ensuring the system is applying the required amount of irrigation evenly and in a given period of time
(c) Ensuring the system is in good working order at all times
(d) Correcting all minor faults correctly and promptly
(e) Reporting major faults accurately and promptly
(f) Carrying out the task at an industrially acceptable rate
(g) Operating within Local, State and Federal Government regulations
(h) Applying the appropriate safety procedures
(i) Cleaning up and putting away all equipment

GUIDELINES :

The standards shown specify a level of competency
AT THE TIME OF ASSESSMENT

POSITION VACANT

TEACHER OF AGRICULTURE
FOR
12 MONTHS
(MATERNITY LEAVE-LEETON HIGH SCHOOL)

IF YOU ARE A FULLY TRAINED TEACHER OF AGRICULTURE SEEKING APPROXIMATELY ONE YEAR OF WORK COMMENCING FROM AUGUST 1994, LEETON HIGH SCHOOL REQUIRES YOU!

LEETON HIGH SCHOOL , SITUATED IN THE RIVERINA REGION, IS A FRIENDLY AND DYNAMIC SCHOOL OF APPROXIMATELY 635 STUDENTS.

AGRICULTURE IS FULLY ESTABLISHED IN 7-10 DESIGN AND TECHNOLOGY AND IN YEARS 7-12 UP TO 3 UNIT AGRICULTURE.

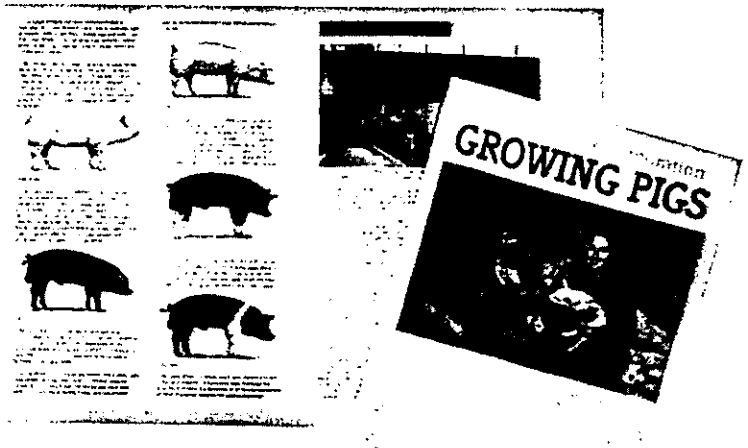
AN INTENSIVELY DEVELOPED AGRICULTURE FARM AREA INCORPORATING A REGISTERED POLL DORSET STUD IS ALSO A RESOURCE OF THE SCHOOL.

ASSISTANCE WILL BE GIVEN WITH PROGRAMS/RESOURCES AND IN FINDING SUITABLE ACCOMMODATION.

IF YOU ARE INTERESTED OR REQUIRE FURTHER INFORMATION PLEASE CONTACT SUE BEHAN OF AN EVENING ON 069 556261
OR WRITE TO HER AT

BOX 671, LEETON, 2705

MORE INFORMATION FOR SCHOOLS



APC has produced a new brochure to introduce students to the basics of pig farming. *Growing Pigs* is a full colour, twelve page booklet with sections on commercially grown breeds, what pigs eat and drink, where they are housed and how they are cared for.

The education project was promoted by the joint communication group PIL. The Pig Information Line involves personnel within APC, PRDC and PCA and handles the general public relations needs of the industry.

This new booklet complements the other two in current use that APC has produced entitled *Pigs* and *Food Science*. Like the other two, *Growing Pigs* has been sent to every secondary school in Australia, addressed to the librarians and subject masters most closely associated with agriculture, science, economics or general studies. On request from the teachers a class set of 30 will be sent.

The teachers can then use the booklet to form the basis of detailed lessons on aspects of pig farming. In this way educational and factual information about our industry is made available to all students in both city and country regions.

Fifty thousand copies have been printed in time for the first school term in 1994. Copies will also be available for State pig fairs and field days.

We have over three million students currently in primary or secondary education (see table for accurate breakdown). If we can influence these children positively towards eating pork then the future of the pig industry is assured.

APPLICATION FOR MEMBERSHIP TO THE N.S.W.A.A.T.

NAME: _____

SCHOOL: _____

SCHOOL ADDRESS: _____

_____

POST CODE: _____

SCHOOL PHONE: _____

SCHOOL FAX: _____

MAILING ADDRESS: leave blank if same as above.

_____

_____ _____

** Government School Non-Government School (Please Circle)

I ENCLOSE PAYMENT OF **$40.00** BEING THE SUBSCRIPTION FOR THE NEXT BI-ENNIAL PERIOD AS A FULL INDIVIDUAL MEMBER OF THE N.S.W.A.A.T.

OR

WE ENCLOSE PAYMENT OF **$60.00** BEING THE SUBSCRIPTION FOR THE NEXT BI-ENNIAL PERIOD AS A CORPORATE BODY MEMBER OF THE N.S.W.A.A.T.

OR

I ENCLOSE PAYMENT OF **$20.00** BEING THE SUBSCRIPTION FOR THE NEXT BI-ENNIAL PERIOD AS A STUDENT MEMBER OF THE N.S.W.A.A.T.

NOTE: THE BI-ENNIAL PERIOD ABOVE WILL CEASE AT THE JANUARY 1995 A.G.M. TO BE HELD AT THE NEXT BIENNIAL CONFERENCE. i.e. membership covers 2 years from 1993-1995.

Full membership from new members wishing to join in the second year of the biennium will be charged a pro-rata fee of $20.00.

PLEASE FORWARD YOUR COMPLETED FORM ABOVE **ALONG WITH YOUR FEE TO:**

JOINT COUNCIL
AGRICULTURE
P.O. BOX 577,
LEICHARDT 2040.

EVALUATION / QUESTIONNAIRE

*YOUR ASSISTANCE IN COMPLETING THIS EVALUATION AND QUESTIONNAIRE WOULD BE APPRECIATED AND WILL ASSIST IN THE PLANNING AND DEVELOPMENT OF FUTURE ISSUES.
*ANY ADDITIONAL COMMENTS ARE WELCOMED AND YOU ARE REQUESTED TO SEND ANY INFORMATION, WORKSHEETS AND RESOURCES THAT YOU FEEL WORK WELL FOR YOU AND THAT OTHERS MAY BENEFIT FROM.
*FEEL FREE TO BE ANONYMOUS IF YOU WISH.
*PLEASE RATE THIS ISSUE OF B.A.A.T. IN TERMS OF THE CONTRIBUTION YOU FEEL THE ARTICLES MAY HAVE TOWARD YOUR TEACHING, AWARENESS &/OR PROFESSIONAL DEVELOPMENT.
(placing a ***tick*** in the box next to the article is all that is required)

ARTICLE OR SECTION	VERY VALUABLE	OF SOME VALUE	VERY LITTLE VALUE
presidents report			
editors report (letters to editor in future??)			
H.S.C. answers			
Conference report			
Rural Training Council info			
Syllabus committee report			
D&T-McMoney Mushrooms			
School Feature- Tweed River High			
National Farm Skills Guide			
Order forms/fliers/general resources			
"Bits and Pieces" of information			

PLEASE LIST IN THE SPACE BELOW ANY **GENERAL COMMENTS** YOU HAVE CONCERNING **THIS ISSUE** OF B.A.A.T.

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_____

_____

WHAT TYPE OF INFORMATION OR CONTENT **WOULD BENEFIT YOU MOST** IN FUTURE EDITIONS OF B.A.A.T.?

_____

_____

_____

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_____

PLEASE TAKE A MINUTE TO FILL THIS OUT AND MAIL TO :

S.TEMMINGS (B.A.A.T. EDITOR)
FARRER M.A.H.S
CALALA VIA TAMWORTH 2340

OR WHY NOT ***FAX STRAIGHT AWAY*** TO FARRER ON **067 679451**
ANY MATERIAL YOU MAY HAVE FOR INCLUSION CAN BE SENT OR FAXED TO THE ME AT FARRER AT ANY TIME!!
LET'S MAKE THE INFORMATION FLOW GOOD FOR N.S.W. AGRICULTURE TEACHERS!! ITS **YOUR** JOURNAL!

NAME AND SCHOOL: (optional) _____