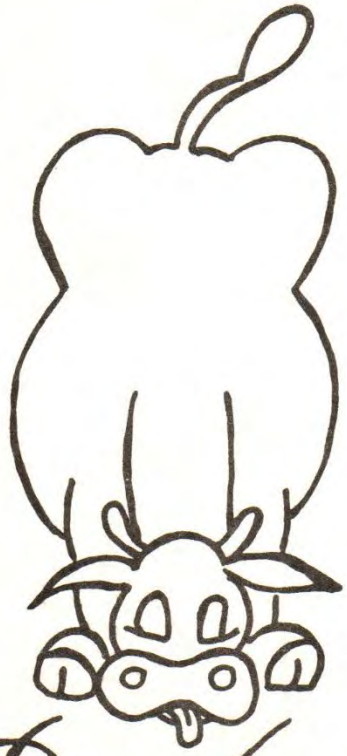
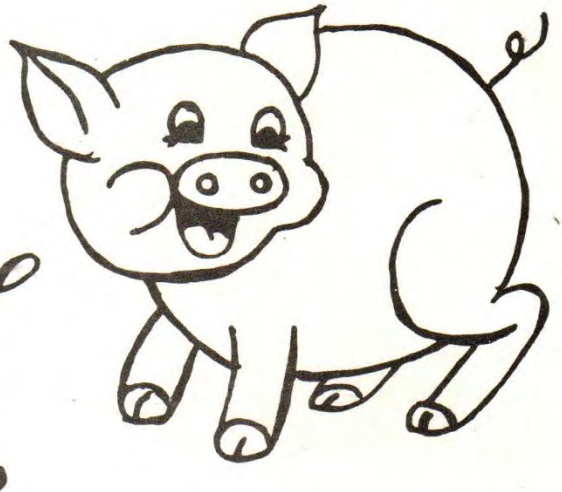
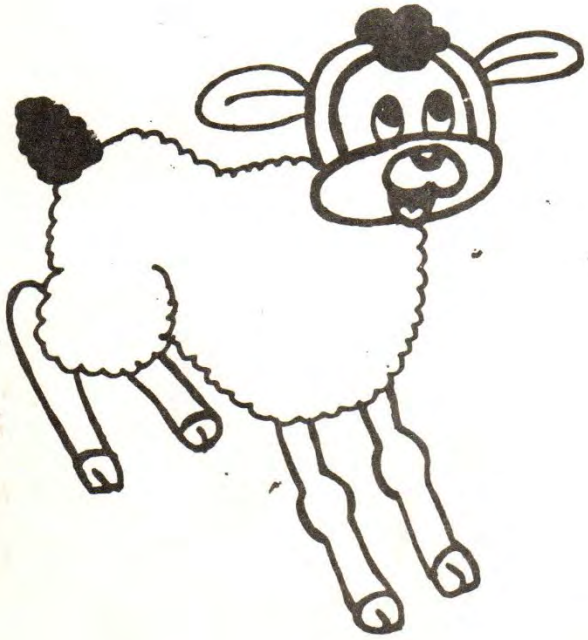
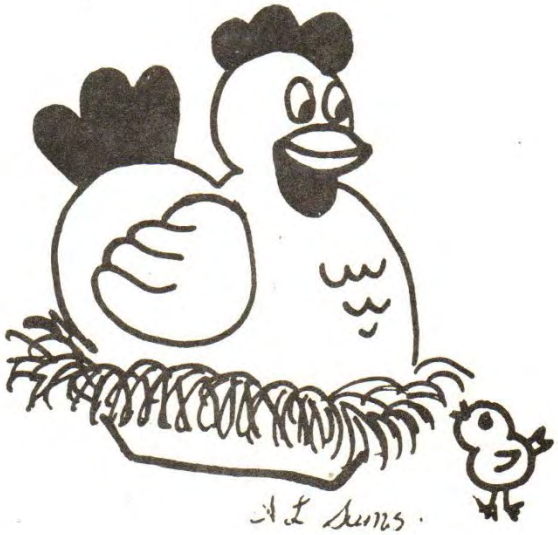
Bulletin of the N.S.W. Association of Agriculture Teachers



B.A.A.T.







Volume II 1988



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EDITORS REPORT

The Fifth National Agricultural Teachers Conference, held in Perth over the school holidays was a huge success to the 40 delegates that attended from all over Australia. I was glad to have the opportunity of being one of the NSW representatives, and hope that this Edition of BAAT will highlight the main issues and stimulate some ideas. The Conference **WAS** a resounding success both socially and Educationally.

Many delegates made committments, and assisted in the preparation of Draft Recommendations to politicians and Industry. It was a Conference where even the guest speakers didn't want to leave without making some motion or leaving a plan of attack to follow up upon.

The Conference was based on four major themes,

1. Initiatives in Agriculture
2. Technology and Farming
3. Education in Agriculture
4. Improving Education in Agriculture

Congratulations need to be extended to Lindsay McNeill and his team for organizing the top people in their respective areas to extend our professional development in a number of areas.

Speaking to delegates from other states it was clear that the impact of Government cutbacks, and the mass exodus of experienced Agriculture teachers was taking its toll on the morale of all involved in Agricultural Education.

It was also clear that Agriculture teachers are a dedicated lot, and they rallied in the spirit of the seasoned Australian cocky. During the conference we examined reasons for the lack of participation in Agriculture by both teachers and students, and although things looked grim, we were persuaded (with the help of some good WA wine & cheese) to look on the bright side.

In order to reverse these trends, we realized that we could not depend on the Department of Education. If Agricultural education is to continue into the 21st century, and if Australias future farmers are to continue to remain competitive, we must turn Agricultural Education into ..***Agribusiness***... Industry leaders will have to become involved, both in the planning and corporate sponsorship of a small group of innovative educators.

It is the fact that we exist in small isolated pockets, that has enabled the Government and the community to some extent, to ignore our plight. We must be clear in our direction, stir up the public, and promote the teaching of a subject that is more difficult than many of the Sciences, as it is based on a greater range of rigorous skills.

I was grateful for the opportunity to attend, and I sincerely hope that this report may help other Agriculture teachers, like myself, who was sitting on the fence. I really didn't know whether to leave for the Industry highlights or stay with an ever decreasing number of dedicated Ag. teachers.

BIENNIAL CONFERENCE
TOCAL 1989

Plans are well underway for the NSW Ag teachers Association Biennial Conference to be held at Tocal Agricultural College in January 1989.

The Executive has had several meetings and made tentative bookings with several key speakers in the Hunter Valley. The theme will be, "**A Hands on Approach to Agriculture**" as it was felt at the last conference that we tend to drift away from the realities of farming or at the very least lose touch with the latest practical skills, as we simply do not have the time to attend many field days etc.

Included as an appendix is a **DRAFT** Program. Please give us some feedback, and contact either myself, Ivan Gant or Nigel Cox.

IAN FOREMAN

INITIATIVES IN AGRICULTURE

INTRODUCTION

- Lindsay McNeill
- President WA Agric Educators Association.

With the current upheaval of Ag education in WA following three ministerial inquiries in the last few months, these is a great need to look for innovations in Education. Advances in technology and methodology will need to be examined in order to provide the best quality of education for our students.

On a lghter note, the current high prices paid for wool have stimulated some questionable innovations in WA

Many sheep have been reported stolen. One farmer reported to police that his sheep had been returned to his property three days after being stolen, minus their wool....

Another farmer returned to his property late one night to find a semi trailer backed up to his sheep yards. When the farmer questioned the driver as to his purpose, the driver replied ..Aren.t these the sheep you purchased at the sale today?..

When the farmer replied that he had not bought any sheep, the driver muttered that there must have been some mistake and that he would have to reload the sheep and find their rightful owner. The farmer felt sorry for the driver and assisted him to reload the sheep.

It was only the next day that he realized he had helped a thief escape with 300 of his own sheep.....





2. OFFICIAL OPENING -

- Dr Carmen Lawrence
- Minister for Education.

The minister grew up on a family farm in the northern wheatbelt, and assisted in the development of the farm business. From here she has obtained a Doctorate of Philosophy, and has worked as a research psychologist.

Dr Lawrence looked back at the good years of the 50.s and 60.s, and pointed out that todays agriculture is now a complex business in a tight economic climate.

Education in WA has come under the microscope and faced three major inquiries in recent times. These have made many recommendations including, a lack of good teachers, an educational focus that is out of touch, and not meeting the needs of complex industry that is changing rapidly.

These reports and their negative findings have had a destabilizing effect on the teaching of Agriculture in this state. The minister was sympathetic to teachers who were mostly doing their best in a difficult system. Teaching agriculture was a difficult task due to the multifaceted nature of the subject.

Agriculture teachers will need develop flexible approaches to meet the complex nature of the subject. Both practical and thinking skills will need to be developed, that will enable students to synthesize information and solve complex problems.

The content of courses will become less important in the constantly changing world we live in. If we look back to our own education we remember the ..How to..... but seldom the content of the course. Problem solving skills will be essential in the education of tomorrows agriculturalists. These skills will range from the simple, such as how to modify a machine to do a particular task, to the complex problem solving skills that are needed to get the greatest output for a sustained period of time.

Governments will need to provide increasing amounts of inservice to allow teachers to refresh and extend their skills in this problem solving area. However, due to the small % of Agriculture teachers the opportunity and the need to provide this inservice time will be small.

3. THE RURAL INNOVATIONS CENTRE



- Ernesto Sirroli
- Manager Rural Innovations Centre

Ernesto was a very stimulating speaker, a dynamic person that has been largely responsible for the establishment of the rural innovations centre. He pointed out the following aspects of our current trading pattern, that has lead to a need for rural innovations.

* We Import a greater quantity of goods than we export
* We export raw materials then buy back value added products
* We import products that we have an abundance of in Australia. for example we import Eucalyptus oil, Fish, wheat bix, etc.

In terms of dollars, $30 Million Imports = $30 million Exports. The difference in the equation is jobs. For example 5-10 million people are employed all over the world to process the wool we produce here in Australia. There are many new jobs that could be created here in Australia, if we learn NOT to export Raw material until we have optimized the return from the raw material.

Unless we do something to redress the trade imbalance, we will become Argentina Revisited. We must look towards our marginal agricultural land for experimentation on a small scale for unusual crops such as nuts etc. It is only when people experiment sensibly, and when they have a passion for change, that innovations will be successful.

Innovations cannot be imposed from above. Governments cannot for example suggest that NSW farmers plant 20,000 hectares of tagaste. What is needed is a centre that can help farmers with a passion for innovation. Ernesto and his colleagues have helped get many successful ventures off the ground by finding information and providing skills for the new project. They provide market research activities and feasibility studies.

Our present Agricultural industry produces few products, relatively cheap and no value added, this needs to change to a situation where we produce many, quality products, expensive with a value added.

Ernesto emplored us to take this issue of innovation back to the classroom and highlight the need for innovations in Agriculture, and the necessity to produce value added products. As an exercise, ask the students to find out how much wheat bix costs per tonne, and then ask them to relate this back to the cost of the raw material, Wheat.

Wheat - $150/tonne approx Wheat Bix - $6000/tonne

The symbol of the innovations centre is the flying pig, and this points out that with passion and skills that impossible can become possible.

4. DEVELOPMENTS IN PRODUCTION HORTICULTURE



- Philip Watkins
- Technical Director, Sunglow Flowers

Although production horticulture included several different major crop lines, like vegetables or fruit, the area which has attracted much attention and investment in the last few years has been cut flower production.

Two types of cut flowers are being developed, these are,

* Australian Native species as new cut flowers
* Traditional cut flower varieties under Australian conditions

Successful development of either type involves careful consideration of market trends, particularly where major markets for produce are overseas. Market trends for cut flowers follow popularity curves which increase in the initial development phase, then plateau and eventually decline as new varieties or types supercede the old.

The price paid for the flowers at the market tends to be proportional to its popularity. It is therefore important to target production to coincide with the upward slope of the curve. It is also necessary to change or update varieties according to the market trends.

There is much interest on overseas markets for Australian Native flowers, provided good quality supplies can be assured. To achieve this is has been necessary to,

* Cultivate varieties rather than harvest them from the bush.
* Grow a range of varieties that produce lots of flowers, have bright colours, a good shape and a vase life, at least 7 days.
* Develop propagation and production techniques for previously non-cultivated species.
* Select for new colours with improved production and cut flower longevity.

Traditional cut flower varieties are always in demand, but to make money one must choose flowers which can be,

* grown well under local soil and climatic conditions to produce similar or better quality than can be produced overseas. This has lead to the development of semi-controlled environmental structures.
* grown at a different time of the year to that overseas to provide a marketing advantage.
* grown economically and have a high value in the market place

Cut flower production is a challenging exercise particularly if one desires to market produce on international centers. It is highly competitive and it is essential that a top quality product is available to command the price required to cover the high freight costs in getting the produce to market. Cut flower production development is therefore fraught with dangers. Some of these are,

1. Unforeseen difficulties in producing and marketing new crops

2. Lack of expertise in production

3. Investors in the Industry often require quick returns, which is NOT a feature of this industry.

4. Need to produce significant quanti ties of a new product to have an impact on the market place.

Cut flowers are in high demand on world markets and production is increasing to meet this demand. However with increasing production ventures there will be successes and their will also be failures.

5. DEVELOPMENT OF PLANTS FOR BROADACRE FARMS.



- Dr Clive Francis
- Chief Research Officer
WA Dept Of Ag.

In line with the innovations theme of the day Dr Francis presented a concise view of the current position of new plant varieties available for broadacre farmers in the 90.s

He firstly justified the large amount of money that is spent on plant breeding. Over the last 5 years 23 million dollars

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has been spent on plant breeding, however the extra yield generated by the improved varieties has generated an extra income of some 199 million dollars.

WHEAT- The average wheat yield in Australia is generally well below the genetic potential of the crop. This has generally been due to poor management or nutrition. However in recent times the average yield has been on the increase, due in part to the increasing use of grain legumes as part of the crop rotation and the associated increases in the soil N level.

Many good wheat varieties have been thrown out in the past because they did not meet the stringent baking qualities associated with pan bread. This is a shame when now 1/3 of our soft wheat sales are for Japanese noodles. There is a much greater market for wheat these days with the following range of hardness in the grain,

BISCUIT --> JAP NOODLES --> CHINESE NOODLES --> ARAB BREAD --> PAN BREAD

SOFT HARD

New varieties are slowly coming onto the market, with a growing trend for Varietal packages. These offer the new variety with a host of management information that will suit the area the crop is being considered for.

BARLEY - There still exists a $15/tonne premium for the malting barley types over the feed types, and the adoption of barley has been slow. This is strange when one considers that Barley will outyield wheat by 25% in the marginal crop growing areas.

Another side benefit of Barley only recently discovered, is the suitability of the stubble for paper pulp.

Most research is being conducted into the breeding of later maturing varieties to increase the yield potential of this crop.

OATS - Dr Francis estimates that this crop is worth some 100 million dollars to the economy when one considers the grain and hay value of the crop.

Dwarf varieties are in the pipeline, with a grain yield potential of 25% over the traditional varieties. These crops have a high harvest index and are suited to ares that grow the crop primarily for grain. The ratio of grain to vegetative yield being very high.

The interest by specialist industries has stimulated the demand for oat grain. Some examples include Rolled Oats, Oat Bran (supposed to reduce cholesterol) and health foods.

RAPESEED - This is seen as an oil crop with potential as it has the lowest saturated oil content of any of the oil seeds. Known as ..Canola.. in the states (as they didn.t like the connotations associated with its more common name) it has a high Oleic acid content (70%).

It has the reputation of being a healthy oil world wide due to its high Oleic acid yield, and current research is aimed at breeding later maturing varieties to improve the yield content. Work is also focussed on root disease problems that lead to many failures with early rape varieties.

PEAS - A very ..Risky.. crop with only 20,000 of the 50,000 hectares of peas planted, actually harvested last year. Often at the mercy of the weather, however the demand for the crop remains high and continues to grow.

More erect and harvestable types are being bred, and are being seen as an alternative to lupins on duplex and loamy soils, as trials have shown peas to out-yield lupins under these conditions.

TRITICALE - Far from forgotten, this crop has received considerable attention, for its considerable soil binding qualities and its ability to do well in marginal crop growing areas. With high rates of super being used in the past and the associated soil acidity problems,

Triticale research is still continuing.

LUPINS - Have had a big resurgence in the past due to their great feed value and the large amount of nitrogen they place in the soil during their growing period. One big drawback in the sheep areas has been the incidence of Lupinosis (a degradation of liver cells) where lupin stubble has been used as fodder.

The Department now has a new variety ..Yungro.. which may have solved the problem of Lupinosis. This has been sold for $1,200/tonne to commercial seed growers. Who said there wasn.t any money in plant breeding.

6. ANIMAL BREEDING



- Mr Lindsay Wolrige
- Manager Anamtech

This session traced the relatively short history of the Animal Breeding industry and the use of AI and ET. (Artificial Insemination and Embryo Transfer)

Selective breeding began with Arabs in the 1900.s when they selected inferior stallion to breed with opponents herds to reduce the effectiveness of their battle horses.

The next major effort in Animal breeding was in the 1960.s Herd recording system, and the introduction of performance measurement in terms of productivity.

Frozen semen began in glass vials, however these were relatively large vessels and survival of the semen was variable. The development of the 0.5 cc plastic straw, lead to much better results. This related to the much larger surface the volume ratio and the much more rapid freezing.

Recent developments have seen the separation of semen into male and female sperm cells, by using either,

(a)Gravitation - male sperm much larger.
(b)Metabolic activity - female sperm more active.

It is only in the last 10 years, that ET has been feasible. This has been made possible via the use of the laparascope, and the ability to produce large amounts of prostaglandins at economic prices.

With the commercial use of prostaglandins it became possible to synchronize a large number of recipient cows to be on hand when embryos were flushed from the donors.

The development of non-surgical methods has enable ET to be used by commercial breeders. The placement of embryos via semem straws into the uterus of the recipient cow has halved the cost of ET. The use of glycerol for freezing embryos and sucrose for re-hydrating has greatly improved the success rate of ET in commercial herds.

Splitting of embryos is now practiced fairly widely, and has great potential in health testing. This means that one half of a split embryo may be extensively tested for disease etc whilst the other half may be exported/imported.

Embryo splitting has also lead to the development of ..Chimiras... This is a situation two fertilized embryos from different cows, are split then the respective halves swapped. This effectively means that it is possible for an offspring to have the influence from four parents in one generation.

For the future, research is being conducted into the washing of embryos to remove exotic bacteria. Other researchers are examining the possibility that freezing may change the genetic content of the embryo. Present evidence with bacteria and yeasts indicates that this may not be the case.



To conclude Mr Wolrige stressed that we should not ignore the possible intervention of the Animal welfare in the future, but should invite them to discuss all developments in this area. Really, at this time they should have no argument as ET and AI greatly reduce the transport costs and stress that would be associated with moving superior animals around the country side. Also the improved genetics will mean that the offspring are stronger and more resistant to attack from pests and diseases.

TECHNOLOGY AND FARMING

1. COMMUNICATION TECHNOLOGY



- *Dr Jim Lang*
- General Manager
- General West Network Television

Not so long ago the Agricultural Industry was told to ..**Get Big or Die**..... In todays economic climate this is not the answer, and the success of many of todays farmers has been the slogan ..**Work Smart or Die**.....

The same strategy should apply to the education of Agriculturalists. With the knowledge explosion of this century we all agree that teaching content is impossible, and most courses reflect a skills based approach. To teach these skills we need to access information, however this information usually has a cost associated with it.

In line with our new slogan we should only pay money for this information if there is a positive benefit on the impact of the skills we are trying to impart. In other words, if there is a positive cost/benefit ratio.

In rural situations it is becoming increasingly difficult to produce a variety of instruction, and provide equal opportunity for these isolated students. The solution to this dilemma has been approached in the past by creating large Agricultural High schools. This has met with little success and has greatly increased transport/accommodation costs whilst removing the advantages of having small groups doing practical activities in their local areas.

Tele-Learning - is one option that does have a positive cost/benefit ratio, and removes many of the barriers associated with rural education, including the problem of exposing lots of students to interaction with leading people in various aspects of agriculture.

This technique involves connecting schools over the phone line via a modem connected to a personal computer (PC). Also connected to the PC is a graphics tablet. This enables verbal communication, communication with text, and enables students to respond to drawings on the PC screen via input through the graphics tablet. All communication is instantaneous, and allows for up to 3 students to talk at once.

The cost of the connect time has been provided by corporate bodies, and the hardware costs minimal over the initial cost of the PC. Student and teacher response to trials conducted in America has been surprising, with student comments such as,
..We pay more attention to the computer than the teacher....
A teachers comment, ..Initially I was not in favour of this option, however it has allowed my small class to have interaction with Agricultural experts that would not have been possible before...

Full Video Interaction - is a refinement of the above technique. As the name suggests classes are placed in contact via the Video camera. The lessons originate in a TV station, where the Agricultural host is located, here text and graphical information can be displayed and the station organizes the interaction via the incoming video signals.

All that is need for schools to participate is a TV and a video camera, but who

pays for the TV time. In WA the stations licence requires them to provide 2 hours of free broadcast time each week. Mostly this has been to broadcast educational tapes that have been running (in some cases) for many years.

Why don.t we as teachers make use of this technology, that for the most part is FREE ..... in some cases it is because,

- We are ignorant or fear new technology
- We are apathetic towards new technology
- We lack encouragement by our superiors

If we are aware of our shortcomings and those of the people around us, then maybe we can address the situation and ..**Work Smart**..... in the technological age of today.

2. COMPUTERS ON THE FARM -



- Mr Tony Kubicki
- Adviser WA Dept of Agriculture.

With the increasing cost price squeeze efficient resource allocation is becoming a major part of farm business management. When considering the managers (and spouses) goals, conflicts can arise Computers are now more often used to resolve these conflicts and aid in describing the current situation and predicting the effect of current decisions on the profitability of the farm in the future.

One great asset of the computer is its ability to provide sensitivity analyses of decisions made. This enables to farmer to ask ..What if..... questions, such as what ..What will happen to whole farm profit if the price of wheat increases by 20% in the next 6 months...

As well as this application of the Personal Computer in aiding farm decision making, current and future applications of the micro-processor (the brain of the computer) include,

* ***Machinery Controllers*** - adjusting tractor according to the load of the implement to make efficient use of fuel.
* ***Data Loggers*** - recording livestock data such as weight etc as animals pass through a drafting race and storing the data.
* ***Communicators*** - allowing the manager to access data banks and extract up-to-date information to solve problems.

The IBM computer is seen as the best farm computer for the 90.s due to the vast range of support software, the open and expandable architecture, and its current wide use. The Macintosh is seen as having little impact in the farm business world as it has a relatively closed architecture, and limited software support.

The acceptance and use of computers varies greatly between states, for example in WA 10% of farmers are using computers, while in NSW only 2% of farmers use computers on farms. Reasons for this discrepancy include,

* The WA Department investing in portable PC.s to demonstrate their use and flexibility on the managers farm.
* The younger age of farm managers in WA (40 cf to 62 in NSW)
* The formation of many special user groups
* Extensive on farm consultancy by the Department of Agric.

The WA Department of Agriculture has developed, out of necessity in many cases, an extensive library of Software that has been tried and proven in the field, including,

A. ***Paddock Cull*** - a lotus worksheet that determines the yield required to meet the variable costs associated with that particular paddock. Paddocks can then be ranked in order of profitability. This can prove invaluable, for example when time is short or money limiting the most profitable paddocks can be planted first.

B. ***ZACK*** - another lotus work sheet in the form of a cash flow planner that will perform all of the cash budgets as well as producing gross margins to help

enterprise planning.

C. ***NP DECIDE*** - A modelling program to simulate Nitrogen and Phosphorus use. It considers climatic data and can be used to predict the effect of current fertilizer decisions on crop yields in the future.

D. ***WOOL MODEL*** - another modelling program to model the effect of current decisions on many aspects of wool systems such as wool yield, weaners weights etc. Climatic data is incorporated.

These programs are very reasonably priced, especially to educational institutions, often under $200 and some as low as $25.

With the increasing use of computers to access information, dial up data access will cost a considerable amount of money as you usually have to pay not only for Telecom connect time but also a connect time for the use of the computer at the other end of the phone line. Optical disks are seen as the answer in the future. These optical disks (very similar to the Compact Disks used to record music) have the ability to store all of the Agdex files ever produced on ONE disk and to access the information very rapidly given a few keywords.

3. AGRICULTURE IN THE PRIMARY SCHOOL -



- Mrs Jan Ackroyd
- Education Officer
- Kelmscott Senior High School Farm

There exists a great need to stem the many and varied misconceptions that exist in the minds of Primary School students. Some of the classic ones include

Chocolate milk comes from chocolate coloured cows, a misconception promoted by the media in WA.
Milk comes from cartons that are made in factories, not from cows.
Eggs come from factories, chooks couldn't lay something as big as an egg.

With the increasing Urbanization of our society, young children are having less and less contact with farm animals. These misconceptions may be difficult to break when students enter high school and may deter potential students from studying Agriculture. They may see agriculture as being rather simplistic and view industry as the provider of our food.

The solution is not a new subject in the primary school, but rather an integration of Agricultural experiences into the Primary Curriculum. Jan has spent a considerable amount of time studying the primary curricula and has used agricultural experiences to provide concrete illustrations of concepts in science, social science, etc.

The farm visit is also used to develop the students, observational, communicative and writing skills.

4. ELECTRONIC LIVESTOCK MARKETING -



- Max Cunnington
- CALM Manager Perth

CALM or Computer Aided Livestock Marketing, is in essence an electronic saleyard. Through the CALM system livestock can be bought and sold by auction on a computer without being transported to a saleyard or to some other intermediate destination.

The system has benefits to the many people that use the system, these may be summarized below,

Benefits to Producers -

direct selling allows for reduced handling and transport costs.
maximum competitive bidding through having listed stock exposed to a national marketing network.
reduced bruising and loss of livestock quality
rapid and comprehensive market infor-

mation and reporting
the option not to sell (without the cost of trucking stock home) if the reserve price is not met.
electronic funds transfer will be available post-sale for quick settlement.

Benefits to Buyers/Processors -

instant, easy access to a wide range of livestock
the facility to instantly search for certain types of livestock anywhere in Australia.
reduced buying costs (ie less travel, agents etc)
option of carcass attribute buying, where buyers pay only for what they get.
Less waste through bruising and stress
direct delivery from point of sale to point of slaughter, thus reducing transport costs for the buyer.
improved information flow post sale, including reserves on lots passed in available to the highest bidder so that private negotiations can be continued.

Benefits to Agents -

a new service to offer clients.
the ability to provide a national market
access to comprehensive marketing information and reporting to assist clients.
more sophisticated management and operational efficiency in marketing.

Benefits to Consumers -

Higher quality meat to choose from
improved overall efficiency of the meat and livestock industry.

The Marketing Process - the system relies totally on replacing the buyers visual inspection of the stock with a detailed and accurate description of the live animal. Buyers bid on the basis of livestock description, but final payment is made on the basis of measured attributes of each carcass. Payment price may be above or below the bid price

1. The livestock are firstly *Assessed* by a qualified livestock assessor. These are highly trained people that are graded according to their accuracy, naturally their pay increases substantially as they progress up the scale, so there is incentive to be accurate in your descriptions. One incorrect assessment causes the assessor to slip down one grade.

2. A *Sale Catalog* is then produced which groups the listed lots. Potential buyers have access to this via the CALM system. This information may be searched by the computer to find lots that buyers are interested in.

3. The *Auction* proceeds on the screen with a number of lots auctioned simultaneously. Expiry of an inter-bid timer is used to terminate the bidding process. If a lot is passed in during the auction, the leading bidder is given the opportunity to meet the reserve price.

4. *Transaction Documentation* following the auction the computer produces sales notes/contracts listing the parties to the transaction and the exact basis of the sale. In addition market reports are generated and immediately released into the system for access by CLAM users and the media.

5. *Transport* buyers arrange transport from the point nominated by the vendor, usually the farm gate,

6. *Kill sheet data* information is the responsibility of the buyer. He must send this information back to calm and hence to the vendor.

EDUCATION IN AGRICULTURE

1. AGRICULTURAL EDUCATION IN WA



- Kingsley Waterhouse
- WA Agric Education & Training Centre.

The Educational Structure of Teaching institutions in WA is very similar to that of NSW, in that Agriculture is offered at the following levels,

- Junior High School - Years 8-10
- Senior High School - Years 11-
- Residential Agricultural High School
- Residential Agricultural Colleges (like Tocal)
- TAFE
- University levels

There are some differences in the curricula, in that ALL junior High schools offer Agriculture as units of study, each unit comprising of 40hrs of study.

Students are graded A through to F, where a D or better is required to pass, students are failed, and these are basically the students that don.t complete any work at school and don.t bother to hand in any assignments. These usually account for 10% of the students.

The residential Agric. Colleges have advisory committees, and funding used to be a problem as ALL of it went back to consolidated revenue. Now 25% is refunded to the school within 2 weeks and the remainder is distributed to schools on a needs basis.

They have started an Agricultural awareness program in the Primary school, however they had to raise $10,000 from Agribusiness funds could not be obtained from the department.

Problems are also similar to those experienced here in NSW.

* Agricultural residential schools are effective but expensive.
* Greatly increased retention rates in Years 11 & 12
* Bright students who go to Ag colleges like Tocal don.t qualify for University entrance.

2. IS AGRICULTURAL EDUCATION MEETING INDUSTRY REQUIREMENTS



- Mr Colin Bell MLC
- Chairman of Parliamentary Inquiry into Agric Education in WA.

Australia is now an integral part of the international community. Our daily lives are heavily influenced by world events. The effects of social, cultural and political changes, economic adjustments and industry developments overseas are all felt immediately here.

Our recent experience with international trade, and more particularly the beef industry and overseas financial markets provides us with a graphic reminder of our vulnerability. The sense of security, even complacency, generated in the past by our isolation and a plentiful supply of natural resources has been replaced by the challenge of having to cope with the dynamism of world events.

Central to this is our ability as a Nation to raise our Educational levels and acquire the knowledge and skills which will help us develop into a more broadly based and balanced economy which will take us, in strong shape, into the 21st century.

CHANGES REQUIRED -

During the past 12 months Mr Bell chaired a Parliamentary Committee which has looked into Agricultural Education in WA. During this period the Minister travelled extensively to meet Interest

groups, Industry groups, Educationalists, Rural Organizations, Students and Farmers.

He also had the opportunity to look at developments in New Zealand, NSW Victoria, and South Australia.

One of the recurring issues that was constantly raised with the Committee was the fact that our present day Education and Training system is falling far short of meeting Industry requirements.

Rural Industry groups pointed out that there was a shortage of trained persons right across the whole spectrum of Agriculture. Primarily this can be attributed to,

(a) The low numbers of people choosing Agriculture as a career
(b) The apathy of the Rural sector towards Education and Training.
(c) The failure of our Educational Institutions to realize that the Education and Training needs of the Rural sector need to be delivered in a more flexible mode.
(d) The failure of most Agricultural Institutions to consult with Industry groups when devising curricula and course materials.
(e) The failure to regularly review courses and update course materials
(f) TAFE in particular have an inadequate number or trained Agriculture teachers.

(NOTE - a complete account of the committee.s findings can be found in the Legislative Councils Report, released June 1988, and submitted with this report.)

To Illustrate the severe consequences of these trends and the Importance of Agricultural Education to the Australian Economy, Mr Bell drew our attention to the following factors,

* Generally farmers have a very low rate of participation in formal education. Only 15% of farmers have training that extends beyond Year 10, and 6% beyond Year 12.. This is in stark contrast to the EEC who have 90% and 50% for USA & New Zealand.
* Two out of every three farms are being managed by people who have no training or Education relevant to Agriculture.
* Most farmers have shown little enthusiasm for training courses.
* Agricultural Education has the lowest participation of any Industry in Australia.

This general apathy towards Education and Training will in the long term weaken Australia.s chances of maintaining its share of Agricultural production in the world.s economy.

CHANGES AROUND THE CORNER -

Industry will HAVE to take a greater role in telling Educational Institutions what their NEEDS are. In turn Educational Institutions are going to have to provide a more responsive Education system. Changes will have to occur at National and State levels, at Industry, Regional and Community levels, as well as at the Individual level.

Some of the recommendations of the Select committee were,

* Amalgamation of Horticultural/Agricultural courses at the post-graduate level, into one Tertiary Institution.

* Industry involvement in all aspects of course development

* Review of TAFE Agricultural courses, and develop co-ordination between Universities to allow the opportunity for a natural progression.

* The use of scholarships to provide for further Education and Training for potential Farm Leaders.

In short the community and Industry must accept that if they want a better education/training system, then they also have a role to play. It is not sufficient to leave all the decisions which shape the education and training system to the Government and the Educational Institutions. Industry will have an important role to play also, and as with Agriculture in general it will only be an Integrated approach to this problem that will come with a solution that will

stand the passage of time and the innovations of technology.

3. EQUIPPING FARMERS FOR ECONOMIC SURVIVAL



- Roger Crossman
- WA Rural Adjustment & Finance

THE NEED

In todays economic climate there exists a definite need for economic survival. Agriculture is cyclical process that is never stable, it is either up or down. Seasons and economic conditions fluctuate and some farmers will NOT survive.

FACTORS THAT CONTRIBUTE TO STRESS

1. The level of Debt servicing required is important and we need to consider the ability of the business to repay the debt, sensitivity analysis is also critical to determine this ability over an extended period.

To reduce this stress we need long term repayments, at low interest repayments, over an extended period, preferably with negotiable repayments.

2. Below average productivity levels and unfortunately these are often associated with high expense levels.

3. Poor expenditure control, in terms of,
   - direct operating costs, less than 50% of gross return good
   - personal/educational expenses, 14% of gross return good

4. Climatic disaster

GOOD FARMERS REDUCE STRESS

A good farmer knows where he is and where he is going. Christopher Columbus didn.t know where he was going, when he got there he didn.t know where he was, and worse still when he got home he didn.t know where he had been. And **ABOVE ALL...** He did all this on some other persons money...

Features of a good farmer who will enjoy low levels of financial stress include, those factors which give him a strong personal ability,

- Can distinguish between essential and desirable
- Handles fluctuating profitability
- Communicates effectively
- Aims to maintain production levels
- Monitor business on a whole farm approach
- Has the ability to say NO.. doesn't act on Whims
- Does everything to balance the cash flow.
- Manages effectively, does everything at the right time
- Uses advice to his advantage
- Enjoys his farming....

CONFUSING FACTORS

Equity is often seen as a very important factor, however this is not always the case. In the long term it is more important for the manager to balance what goes out and what comes in.

Diversification is not really an important factor when considering economic survival, more important to do what you are doing, very well. If you like a change, AND you have the technical expertise then a change MAY be warranted.

EXPLICIT INSTRUCTIONS

A Fresh young Agriculture teacher soon learnt the value of explicit instructions whilst conducting a sheep drenching practical with Year 9.

After a detailed demonstration the teacher asked one student to stand at one end of the race, and other to stand at the opposited end. The students each had a drench gun, and they were instructed to,
"Start drenching from both ends ....."

So being obedient students they did JUST THAT...

4. AGRICULTURAL EDUCATION FOR URBANITES



- Dr Marcus Blacklow
- Faculty Of Agric.
- University Of WA

There exists a very real need to provide an Agricultural Education for the Urbanites, if only to stop High Ranking Officials and Ministers making fools of themselves in the media. Dr Marcus believes that beneath an uncaring exterior, city people really do want to know about Agriculture.

Our Deep rooted ***Culture*** gives all of us a biological urge to get out into the country, to own that 25acres, and grow a few veges in the back yard. We all care for pets, and the number of people that turn up for Rose pruning demonstrations etc, shows that people **want** some form of Agricultural Education.

Some ***Businesses*** demand that their executives take some form of Agricultural training in their courses. Bankers for example, are required to undertake some Agricultural studies during their training. Politicians dont always, but should undertake some Agricultural units.

Agriculture *teachers* themselves are in very short supply, and in the future they may have to come from Urban backgrounds.

What can be done ???

Farm studies in Year 10 is an option where all students spend 1 week with a farming family and participate in the activities that are carried out on the farm. Less radical would be to have at least some of the work experience students undertake their work experience on farms.

Agriculture should count as a Tertiary entrance subject, and co-ordination should exist so that students are not isolated in their career choices. Agriculture should not only be taught in isolation from the other subjects. How many people can remember having the element P related to superphosphate when they did their senior chemistry courses ?? There exists many other example in physics and chemistry where some related examples in Agriculture would go a long way to break down some of these barriers.

Agriculture teachers themselves should be forced to spend some time in small rural communities, before they embark on their teaching career. This would enable them to learn some of the bush etiquette, and allow better assimilation of these teachers when they are ultimately posted in these isolated areas.

A mentor system should be established, where teachers in their first year would be assigned a mentor family. This experienced and wise family would assist with the knowledge and skills of practical farming and integration of the teacher and the course into rural community life.

Dr Blacklow felt very strongly about this issue, and did not want the issue to be put to rest and die after the conference had finished, so he put together the following Draft Proposals to be sent to the Federal Minister for Employment and Education.

That the 1980 Conference of the National Association of Teachers Of Agriculture,

 # Shares the concerns of the Agricultural Industries about Agricultural Education in Australia and the widening cultural gap between urban and rural communities.

 # Commends the Federal Government for initiating a review of science and mathematics training in a bid to fill severe shortages of teachers in those areas.

 # Recommends that the Review Committee consider teacher-training in agriculture and that the industrial and cultural needs of our economy and society

need to be stimulated by effective and efficient teaching of Agricultural subjects.

 # That the review committee be informed that agriculture is integral to the teaching of science and mathematics, yet in some states, the study of mathematics and science in year 11 & 12 precludes the study of Agriculture.

 # That the review committee be informed that teachers of agriculture need to be appointed to ALL schools, that most teachers will be from urban societies, and that a mentor-system is needed for the integration of teachers into rural communities and for the utilization of resources in rural and urban societies.

 # that the review committee be informed that the National Association of Teachers of Agriculture is prepared to assist the review committee in its inquiry.

5. AGRICULTURAL EDUCATION WHAT NEEDS TO BE DONE ??



- Mr Ian Fairnie
- Director of Muresk Institute.

The training of Agriculture teachers is a complex issue, and with the current climate of Governmental inquiries, lack of funding, and low teacher morale the number of Agriculture teachers is fast declining.

Many teachers are realizing that their skills are in demand in Industry, and are leaving to vocations where their skills and talents are appreciated. Worse still many new teachers are only teaching for 2-3 years then leaving for private enterprise.

This has reflected back to the Universities and colleges where the numbers of people training to ba Agriculture teachers has fallen dramatically in the past few years.

WHAT CAN BE DONE ??

We need to permeate schools with a knowledge of Agricultural Education, and we need to start young, preferably in the Primary School.

There are many people that can assist with this process, however, we as Agriculture teachers should start the ball rolling. There are many ways that we can promote the value of Agricultural Education,

* ***Be a Role model*** - not only to the students in your class, but to the students in the rest of the school. Promote the image of Agriculture as an important business, not as a subject for the dummies where you learn how to drive the tractor and dig holes.

* ***Promote Skills*** - that are relevant to employers and industry. A survey of 350 business people recently highlighted the skills employers see as important in their staff. Surprisingly the following skills ranked very low on their order of priority,

- Quantitative
- Technical
- Understanding farming
- Recall of course content
- Business/Economic
- Work related

Employers were more interested in other vocational skills that Agriculture has a unique opportunity to stress in its courses. Particularly in the new senior Agriculture course which has a low emphasis on content. We should be promoting skills like,

- Self motivation
- Work with minimal supervision
- Communication
- Be adaptable to change
- Team work

* ***Agribusiness Clubs*** - these can be very successful. Dont start farming clubs etc as you wont attract the better students. Recently Dr Fairnie went to a High school to promote Agriculture as a career, and hence try to attract potential students to the college. When he met with the

Principal of the school he asked if could see all those students interested in a career in ***Agribusiness***... (note the terminology). Instead of only seeing four or five students, over 50 turned up to the meeting.

* ***Rural Knowledge Bowl*** - these work well in the States and have greatly enhanced the publics awareness of Agribusiness. Basically it involves a competition between schools.

In the states they begin with the young students to capture their interest before they make their career choices. Teachers from the competing schools meet and design a common curriculum for a selected topic, eg ..Rural Water Supplies...

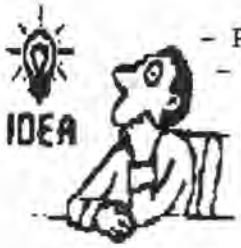
The schools then study this topic and then meet at some common place for the competition. TV stations have supported this in the states and many of these are broadcast. The quiz takes the form of general knowledge questions as well as those based on the topic. It is important that the topic not be too closely tied to Agriculture, such as Blowfly Management in sheep. Make the scope wide enough to attract a cross-section of potential Agriculture students.

* ***Stir up the locals*** - get the community involved. Get community people elected as Presidents of these Agribusiness Clubs. Look for Industry support. In many cases Industry are glad to be invited. Some innovative teachers in SA have run sheep dog trials with thousands of dollars donated from private enterprise.

In the end, Industry and the Department will have to take a greater share of this responsibility, but we need to start NOW in the classroom if we are to continue to be a competitive force in world agriculture.

IMPROVING AGRICULTURAL EDUCATION

1. REVERSING THE BRAIN DRAIN FROM AGRICULTURE



- Prof Allan Robson
- Dean Faculty of Agriculture
University of WA

As pointed out by several speakers, there exists an alarming drift of skilled teachers from a vital profession. Unfortunately this trend spreads across many branches of Agricultural Education. Enrollments in Agricultural Education are the lowest since 1982, and in the USA they are down 50%. Why are people leaving ??

COMMUNITY PERCEPTIONS

The community as a whole sees Agriculture as being of declining importance, and this may be reflected by our performance in world economics. We only produce 4% of the GDP, and only 6% of the workforce are directly involved in Agriculture. Of course to those involved there are many arguments to argue the opposite case, such as the fact that Agriculture contributed to 35% of the value of total Australian exports. However the general community tend to hear more about the former figures.

Agriculture is seen as a ..*Sunset Industry*.., with many of the business people not directly involved in Agriculture. These people believe that the manufacturing sector will lead Australia to its recovery. But this is definitely not true.

In fact upon closer examination, Agriculture has all the features of a ..*Sunrise Industry*.. in that it shows,

- High Growth rates in many sectors
- Flexible production techniques
- Diverse Resource mix

The general community also see Agriculture as *Low Tech*, using simple methods. This image is perpetuated by the TV and radio shows like Dad & Dave, and A Country Practice. We must make sure that the media gets the correct picture of a ***High Tech***, industry that constantly seeks new methods to remain competitive.

Agriculture is also seen as *Inefficient* and *Subsidized*, again we know that this is not the case. In the past 5 years costs of farm inputs have risen to a level where they now represent around 60% of the gross value of the produce. Yet farmers have found ways to reduce production costs so that they still show a profit. As far as protection is concerned Australian Agriculture is one of the least protected in the world (4%), compared to (20%) in the USA, and (100%) in Japan.

REMUNERATION

The second major factor in the Rural Brain drain, is the current low salary levels that people involved in Agriculture command. Farm workers for example receive a much lower salary than their counterparts in Industry.

Any of the bright Uni graduates are going to be Doctors etc, where the pay is more commensurate of their ability. The graduate tax will also have a negative affect on Agric. enrollments. Assuming a flat rate of say 6%, a Agric. student will take 20 years to meet the tax levied whilst a Doctor would take only 4 years.

EDUCATIONAL STRUCTURES

At the present time there are many different reasons for students being at school, including those,

- wanting University entry
- leaving at Y11 to go on a farm
- interested in the subject
- forced to be there by their parents

It is difficult to meet the variety of needs that exists in these groups with one subject, there may need to be many several different Agricultural subjects for students to select from.

Timetable restraints often mean that students cant study Physics, Chemistry AND Agriculture. Also Agriculture is often presented as an EASY subject, when in fact it is more difficult than many of the science options as it is based on a greater range of rigorous skills.

There has been a lack of co-ordination TAFE - Schools and Universities, and an intertwined confusion between *Level* and *Excellence*. A good Farm manager and a good Agricultural Scientist should be considered equal, but in most cases they are not.

This has lead to Agricultural creep, where every one is moving slowly up the scale. What is needed is a clear delineation of the roles at all levels, to remove this confusion and make possible fruitful co-operation between the educational institutions. When this happens it may be possible to develop strategies whereby students can change from one institution to another as their career path changes, or for special subjects in any one course.

CONCLUSIONS

In order to reverse this **Brain Drain**, we need to change community perceptions, address the issue of remuneration, and scrutinize the structure of our Educational Institutions.

2. DECENTRALIZATION OF EDUCATION

- An open forum



This forum provided an interesting insight to the problems and developments that are occurring around the states. There were many points raised, but some of the recurring themes were as follows.

* A continuing decline in the % of students electing to do Agriculture.
* Many teachers leaving the system private enterprise
* A lack of funding for curriculum implementation & inservice
* Lack of morale amongst staff.
* A lack of co-ordination between schools, TAFE, Universities etc. especially in course entry require ments.

In Queensland they have taken an even more ridiculous approach to teacher re-training than our 8 week system. In QLD they are re-training Home science, science, and manual arts teachers for Agriculture positions in **THREE DAYS.....**

On the brighter side, there were many Agriculture teachers who had adopted innovative approaches to their difficult situation, and who were actively trying to promote their subject.

One of the more innovative, is the situation in WA where teachers are trying to raise $200,000 to set up an Agricultural Education Foundation. The funds are rolling in with many industry leaders promising quite large sums of money for the venture. It is planned to use the income from this large sum of money to fund Insevices, Agricultural Education Promotion and increase information flow between the states.

It was felt by the group as a whole that this type of venture should be a National Body, and currently the National Agriculture teachers executive is looking into the situation.

On the curriculum front, many schools are moving towards a Unit approach to the study of Agriculture in the Junior school. It seems to be working well in the schools that have adopted this system. Students have suggested that it gives them more choice, and that they can study the Agricultural electives that interest them.

In the senior school NSW was the only state to have adopted the ..Systems Approach... There was considerable interest in this idea, and teachers did feel that the content oriented approach in the senior school was a little outdated, and contributing to the lack of participation in the subject at the senior level.

In SA the Department has become Regionalized, each region having their own Directorate, Division of Services etc. These seem to be supported well by the local community and Industry. The sheep dog trails held annually attract a large sponsorship from industry bodies and generates quite a considerable interest in the subject at the community level.

NEW YEARS RESOLUTION

IV'E BEEN READING SO MUCH

ABOUT THE BAD EFFECTS OF

SMOKING, DRINKING, OVER-EATING

AND SEX

THAT IV'E DECIDED TO GIVE UP READING

SENIOR AGRICULTURE OVERHEAD MASTER

AVIAN & MAMMALIAN REPRODUCTION



A. SIMILARITIES

* Both involve the union of a sperm & egg for the production of offspring.
* Eggs are fertilized internally.
* Embryos develop in a fluid filled sac.
* Two Testes are involved in the production of sperm, or sex cells.
* Ovaries responsible for the production of ova, or sex cells.
* Tissue development is in the order of Bone -> Muscle -> Fat.
* Both young offspring need care and attention from the mother after birth.

B. DIFFERENCES

* **MUCH** longer gestation period in mammals (9 mnths Cattle, 5 mnths sheep) compared to 21 days in poultry.
* Embryo only carried 24hrs (4% of gestation) in the female in poultry
* Most of the gestation external, in a shell in poultry.
* Chickens can feed themselves as soon as they are born, all mammals need to be fed milk from the mother.

* In **Males**, poultry have the following differences in their reproductive anatomy.

  - Testes are internal, and are the largest of all vertebrate animals com pared to their body size.
  - There is no penis or scrotal sac, semen is deposited by the extension of the cloaca.

* In **Females**, poultry have the following differences in their reproductive anatomy.

  - Only the left side of the female reproductive tract develops in poultry, so only **one** ovary to make eggs.
  - There is no uterus, and the fallopian tubes have become specialized to place a shell around the fertilized ovum.

COMPARING DIGESTION

 RUMINANT	 MONOGASTRIC
(*) Four Stomachs for Digestion	(*) One Stomach for Digestion
(*) Ability to Digest Cellulose & Lignin	(*) Only digests simple carbohydrates
(*) Can improve the quality of the protein in the diet.	(*) Must rely on the quality of the protein supplied in the diet.
(*) Can make Vitamin B, when it is not present in the diet.	(*) All vitamins needed must be present in the diet.
(*) Can lie down and "Ruminate" the feed at leisure after grazing	(*) Does not have the ability to rumi nate, but can eat meat & plants
(*) Some of the energy in the feed is lost as burped gas during the process of digestion (methane)	(*) All of the energy in the feed is absorbed into the blood, except energy required to walk drink etc
(*) The animal can die from bloat when fed of pasture high in clovers	(*) The animal cannnot die from bloat when fed of pasture high in clovers
(*) Takes six or seven hours to harvest the daily feed requirements from good quality pasture	(*) Can eat the daily food requirements in a matter of minutes, then can lie down to digest feed
(*) The amount of feed eaten compared to the amount of weight gained is poor, typically a ruminant eats 5kgs of feed to produce 1 Kg of meat. ie, it is not an **efficient** user of feed.	(*) The amount of feed eaten compared to the amount of weight gained is **Good**, typically a monogastric eats 2kgs of feed to produce 1 Kg of meat. ie, it is a **very efficient** user of feed.
** The Cows digestion is better than the pigs, Discuss giving reasons.....	

NUTRIENT DEFICIENCIES

Many complicated processes are involved in the normal growth of a plant. If a plant is not growing fast the problem may lie in ONE or MORE of the following areas.

a. Chemical problems - too much or too little.

b. Physical problems - poor soil

c. Biological Problems - Disease causing microbes.



In order to get plant to grow fast we need to know if they are getting all of the food that they need. Since plants cant tell us what is the problem we need to look at plants closely to see if they **LOOK** different than they should. When the leaves have funny colours or shapes we say the plant is showing a "Nutrient Deficiency"

Not all chemical problems relate to deficiencies of a particular nutrient, toxcicities (excess nutrients) are also a problem. The following table shows the nutrients in a 2kg cabbage.

COMPONENT	AMOUNT (MG)	COMPONENT	AMOUNT (MG)
WATER 1.8(KG)	1,840,000	Magnesium (Mg)	580
		Iron (Fe)	28
Oxygen (O)	66,400	Manganese (Mn)	10
Carbon (C)	64,200	Zinc (Zn)	6
Hydrogen (H)	9,300	Boron (B)	6
Nitrogen (N)	7,200	Copper (Cu)	1.1
Potassium (K)	6,400	Molybdenum (Mo)	0.11
Calcium (Ca)	3,350	Cobalt (Co)	0.02
Sulphur (S)	1,700	Sodium (Na)	700
Phosphorus (P)	1,000	Chlorine (Cl)	470

It is useful to know what funny colours or shapes mean in the leaves of a plant. For if we know what nutrient is missing then we may be able to add the right kind of fertilizer to make the plant grow faster.

Nutrient	Symptoms in OLDEST leaves
Nitrogen	general yellowing; stunting; early maturity
Magnesium	patchy yellowing; yellow stripes
Potassium	stunting; wilting: scorched margins
Phosphorus	blue-green/purple; large roots; tall growth
Molybdenum	short leaves; cupped leaves; distorted stems
Cobalt	as for N, mainly legumes.

The use of plant nutrient deficiency symptoms can be a useful tool in the diagnosis of soil nutrient problems. However, they should not be seen as the only answer. These observations should be combined with,

(a) Plant tissue analysis
(b) Soil sampling
(c) Fertilizer test strips.

This is because leaf symptoms can also be due to,

* Viruses, fungi and insect attack
* Climatic conditions such as hail and frost
* Poor soil structure
* Pesticides
* Shade
* Water, too much or too little.







PIGGING OUT



BUREAU OF STATISTICS DATA (fromstralian Agricultural Yearbook', 1986, page 30) TO SHOW THAT IN OVERALL TERMS, AUSTRALIANS WILL EACH CONSUME ALMOST 39 TONNES WEIGHT OF FARM PRODUCE IN THE COURSE OF THEIR AVERAGE LIFE EXPECTANCY OF 75 YEARS.

This will include the equivalent of:

* 17 beef cattle
* 92 sheep
* 165,000 eggs
* 10 tonnes of vegetables
* 10,000 litres of beer
* 6 tonnes of grain
* 15 pigs
* 1,171 chickens
* 0.5 tonne of fish, or about 1,000 individual fish
* 2.5 years of fresh milk production by the average dairy cow
* 0.5 tonne of cheese
* 4 tonnes of potatoes
* 8 tonnes of fruit
* 4,005 loaves of bread
* 1 tonne of tomatoes
* the produce of 28 tonnes of sugarcane
* 1,300 litres of wine
* 105 kilos of peanuts
* 195 kilos of rice





DRAFT NSW AG TEACHERS ASSOCIATION BIENNIAL CONFERENCE PROGRAM

JANUARY 1989 TOCAL AGRICULTURAL COLLEGE

MONDAY

REGISTRATION & WARWICK MOORE BEFORE 9.00AM

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	MORNING ACTIVITY PART A	**SHEEP** • Handling – yardwork – catch & throw • Crutch & Shear • Weight Estimation/weigh • Breed Identification	**CATTLE** • Handling – yardwork – mustering • Branding, Catsrating, Vaccination, Tagging Drenching techniques	**BEES** • Hive Inspection • Smoker Strategies • Re-Queening
M.TEA				
11.00 am 12.30 pm	MORNING ACTIVITY PART B	**SHEEP** • Judging • Classification • Future Potential • Contact – Chris Dodd – John Moore	**CATTLE** • Condition Scoring • Livestock Description • Cattle Judging • Contact – Bruce Urquart	**BEES** • Honey Extraction • Bee Management • Bee Diseases • Contact – Terry Brown – Greg Meeker
LUNCH				
1.15 pm	AFTERNOON ACTIVITY PART A	**SHEEP** • Handling – yardwork – catch & throw • Crutch & Shear • Weight Estimation/weigh • Breed Identification	**CATTLE** • Handling – yardwork – mustering • Branding, Castrating, Vaccination, Tagging Drenching techniques	**BEES** • Hive Inspection • Smoker Strategies • Re-Queening
M.TEA				
    5.00 pm	AFTERNOON ACTIVITY PART B	**SHEEP** • Judging • Classification • Future Potential • Contact – Chris Dodd – John Moore	**CATTLE** • Condition Scoring • Livestock Description • Cattle Judging • Contact – Bruce Urquart – Jim Henderson	**BEES** • Honey Extraction • Bee Management • Bee Diseases • Contact – Terry Brown – Greg Meeker
TEA				
7.30 pm	EVENING SESSION	**OFFICIAL ADDRESS** • Norm Thomas – Agriculture Teaching Past and Present. • Biennial Meeting of NSW Association of Ag teachers		

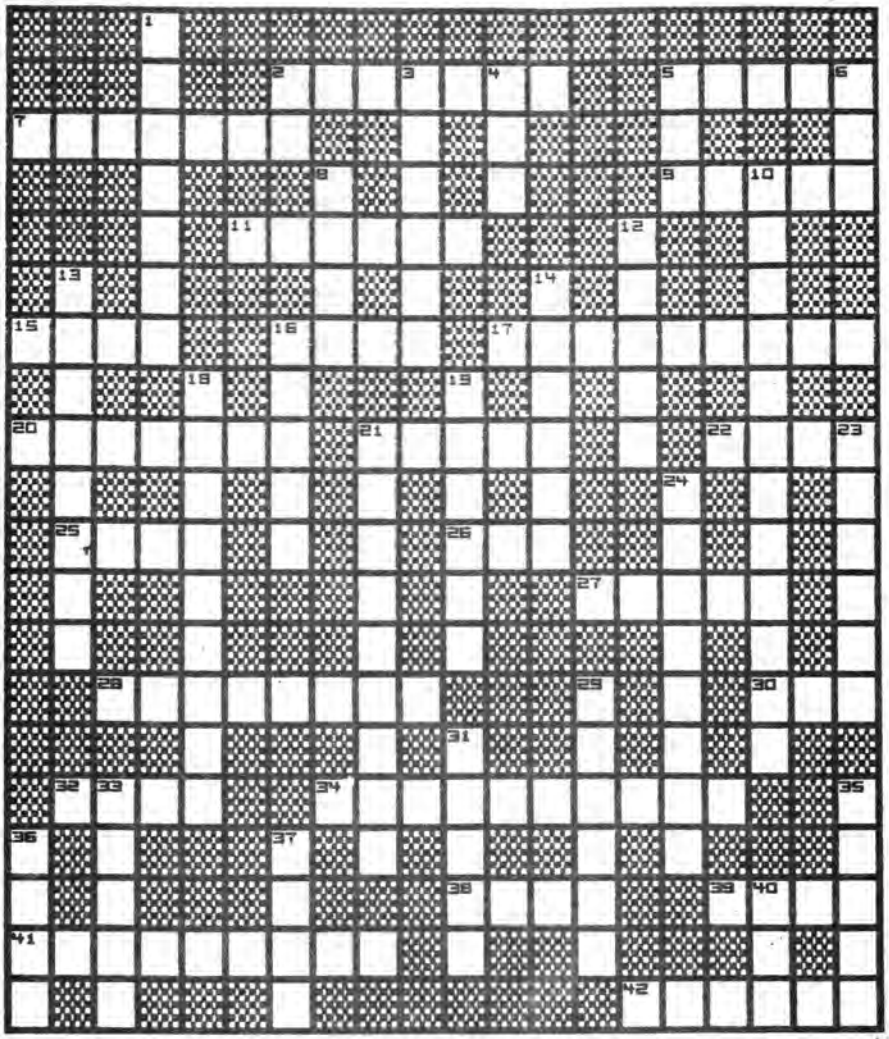
TUESDAY

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	MORNING ACTIVITY PART A	**POULTRY** • Visit Steggles – Hatchery – Processing Factory – Ration Formulation – Sexing Chickens – Others ???	**ELECTRIC FENCING** • Fence Construction • Electric components • Designing systems to suit various applications • Others ???	**AG CHEMICALS** • Spraying • Sprayer calibration • Effective Spraying • Safe Chemical Handling
M.TEA				
11.00 am 12.30 pm	MORNING ACTIVITY PART B	**POULTRY** • Contacts – – John Scarr at Steggles	**ELECTRIC FENCING** • Contacts – – Shirley De Silva	**AG CHEMICALS** • Contacts – – John Frost
LUNCH				
1.15 pm	AFTERNOON ACTIVITY PART A	**VINEYARD TOUR** • Establishing Vines • Pruning • Integrated pest Management • Irrigation strategies		
M.TEA				
    5.00 pm	AFTERNOON ACTIVITY PART B	**VINEYARD TOUR** • Possible Samples ??? • Contact –		
TEA				
7.30 pm	EVENING SESSION	**CONFERENCE DINNE** venue to be announced • ANIMAL WELFARE – Christine townsend ???		

WEDNESDAY

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	MORNING ACTIVITY PART A	**AGRONOMY** • Identificiation of Postures • Identificiation of Weeds • Integ. Pest Management • Pasture Management • Meeting the feed Deficit – Others ???	**TRACTOR SAFETY** • Videos • Demonstration • Safety Maintenance • Student use ?? • Others ???	**EXPERIMENTAL WORK** • Biometry • Experimental design • 3 unit suggestions
M.TEA				
11.00 am 12.30 pm	MORNING ACTIVITY PART B	**AGRONOMY** • Soil Testing Techniques • Machinery Used • Contacts – – Niel Nelson	**TRACTOR SAFETY** • Contacts – – ??? Dept of Ag	**BRUCE RAMSAY** • Topic to be announced – ?????
LUNCH				
1.15 pm	AFTERNOON ACTIVITY PART A	**LEAVE**		

RUMINANT & MONOGASTRIC DIGESTION



ACROSS CLUES

2. A Feathered group of Monogastrics
5. When a plant is "Wilting" it is said to be .....
7. The term for the Digestive juice secreted in the stomach
9. Angoras are a breed of this type of monogastric
11. A storage organ in monogastrics that contains microbes
15. The king of the jungle
16. The number of stomachs that the ruminant has
17. The process of breaking up food into small pieces chemically
20. This nutrient group is supplied in large amounts from meat
21. The first stomach in the Ruminant
22. A monogastric that "Grunts"
25. The male form of a cow
26. This provides warmth and light to our planet
27. Caused when cattle eat lush clover
28. The fourth ruminant Stomach
30. A female sex cell
32. The opposite of False
34. The process of re-gurgitating food to the mouth and chewing
38. The quiet between storms
39. The first sac in the digestive tract of the fowl
41. The common name for the second stomach in the ruminant
42. The common name for the First stomach in the ruminant

DOWN CLUES

1. The ruminant can make this if it is deficient in its diet
2. An abbreviation for a Personal Computer
3. The term for the fluid in the rumen
4. A "Rope" with the "E" left off
5. Man's best friend
6. This is burped from the rumen
8. A number less than one
10. The combining of nutrients to make body tissues
12. Woolly Ruminants
13. The collective term for the organisms that live in the rumen
14. Fungi can digest this in the rumen
16. The group of microbes that digest lignin in the rumen
18. Bacteria and Protozoa digest this in the rumen
19. The third stomach in the ruminant digestive tract
21. The second stomach in the ruminant digestive tract
23. This is added to the food in the mouth
24. The largest of the organisms in the rumen
29. The largest domesticated ruminant
31. The common name for the third stomach in the ruminant
33. The texture of the cows excreta when on lush feed
35. A measurement of how deep something is
36. Asprin is used to cure these when they occur in your head
37. A hard lump of soil
40. The past tense of run

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SUNDAY Registration 4.00 p.m - 5.00 p.m

6.00 p.m. - 7.00 p.m. Warwick Moore External Studies at Tocal

7.30 p.m. Dinner + Welcome to the College by Cameron Archer

MONDAY (Late Registration before 9.00am)

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	*MORNING ACTIVITY PART A*	***SHEEP*** • Handling - yardwork - catch & throw • Crutch & Shear • Weight Estimation/weigh • Breed Identification	***CATTLE*** • Handling - yardwork - mustering • Branding, Cotsrating, Vaccination, Tagging Drenching techniques	***BEES*** • Hive Inspection • Smoker Strategies • Re-Queening
M.TEA				
11.00 am 12.30 pm	*MORNING ACTIVITY PART B*	***SHEEP*** • Judging • Classification • Future Potential • Contact - Chris Dodd - John Moore	***CATTLE*** • Condition Scoring • Livestock Description • Cattle Judging • Contact - Bruce Urquart	***BEES*** • Honey Extraction • Bee Management • Bee Diseases • Contact - Terry Brown - Greg Meeker
LUNCH				
1.15 pm	*AFTERNOON ACTIVITY PART A*	***SHEEP*** • Handling - yardwork - catch & throw • Crutch & Shear • Weight Estimation/weigh • Breed Identification	***CATTLE*** • Handling - yardwork - mustering • Branding, Castrating Vaccination, Tagging Drenching techniques	***BEES*** • Hive Inspection • Smoker Strategies • Re-Queening
M.TEA				
    5.00 pm	*AFTERNOON ACTIVITY PART B*	***SHEEP*** • Judging • Classification • Future Potential • Contact - Chris Dodd - John Moore	***CATTLE*** • Condition Scoring • Livestock Description • Cattle Judging • Contact - Bruce Urquart - Jim Henderson	***BEES*** • Honey Extraction • Bee Management • Bee Diseases • Contact - Terry Brown - Greg Meeker
TEA				
7.30 pm	*EVENING SESSION*	***OFFICIAL ADDRESS*** • Norm Thomas - Agriculture Teaching Past and Present. • Biennial Meeting of NSW Association of Ag teachers		

Conference Program

TUESDAY

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	*MORNING ACTIVITY PART A*	***POULTRY*** • Visit Steggles - Hatchery - Processing Factory - Ration Formulation - Sexing Chickens - Others ???	***ELECTRIC FENCING*** • Fence Construction • Electric components • Designing systems to suit various applications • Others ???	***AG CHEMICALS*** • Spraying • Sprayer calibration • Effective Spraying • Safe Chemical Handling
M.TEA				
11.00 am 12.30 pm	*MORNING ACTIVITY PART B*	***POULTRY*** • Contacts - - John Scarr at Steggles	***ELECTRIC FENCING*** • Contacts - - Shirley De Silva	***AG CHEMICALS*** • Contacts - - John Frost
LUNCH				
1.15 pm	*AFTERNOON ACTIVITY PART A*	***VINEYARD TOUR*** • Esatblishing Vines • Pruning • Integrated pest Monagement • Irrigation strategies		
M.TEA				
  5.00 pm	*AFTERNOON ACTIVITY PART B*	***VINEYARD TOUR*** • Possible Samples ??? • Contact -		
TEA				
7.30 pm	*EVENING SESSION*	***CONFERENCE DINNER*** venue to be announced • ANIMAL WELFARE - Christine townsend ???		

WEDNESDAY

TIME	EVENT	OPTION 1	OPTION 2	OPTION 3
9.00 am 10.30 am	*MORNING ACTIVITY PART A*	***AGRONOMY*** • Identificiation of Postures • Identificiation of Weeds • Integ. Pest Management • Posture Management • Meeting the feed Deficit – Others ???	***TRACTOR SAFETY*** • Videos • Demonstration • Safety Maintenance • Student use ?? • Others ???	***EXPERIMENTAL WORK*** • Biometry • Experimental design • 3 unit suggestions
M.TEA				
11.00 am 12.30 pm	*MORNING ACTIVITY PART B*	***AGRONOMY*** • Soil Testing Techniques • Machinery Used • Contacts – – Niel Nelson	***TRACTOR SAFETY*** • Contacts – – ??? Dept of Ag	ROD NASH – Dairy case study
LUNCH				
1.15 pm	*AFTERNOON ACTIVITY PART A*	– Evaluation – ***LEAVE***		