AUSTRALIAN NUFFIELD FARMING SCHOLARS ASSOCIATION

REPORT OF VISIT TO THE UNITED KINGDOM

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(Victorian Scholar 1988)

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A U S T R A L I A N N U F F I E L D F A R M I N G

S C H O L A R S H I P

REPORT BY WILLIAM A. SPEIRS

VICTORIAN SCHOLAR 1988

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OBJECTIVES:

1. To study in Britain the use of trees on farms and to implement any new ideas which would be beneficial to the rural environment in Australia.

2. To study the beef cattle industry and in particular the Simmental Breed and other minority breeds useful for cross breeding with the above.

ACKNOWLEDGEMENTS:

My sincere thanks to all those who assisted me to complete my scholarship in a planned and pleasant manner. They include my wife Prue and sons Sam and Tom. My brother Jack and wife Susie. My father, family and farm staff who willingly accepted the extra work load and responsibilities. Without them the acceptance of the Scholarship would have been very difficult. The Australian Nuffield Farming Scholars Association - Mr. George Wilson in particular for all his help.

Particular thanks must also go to :

- Qantas (for return airfare and smooth travel arrangements),
- Victorian State Bank
- The William Buckland Foundation
- The Milk Marketing Board in Britain for the provision of a car during my entire stay in Britain
- The Nuffield Farming Scholarship Trust - its network of scholars and the Director, Captain John Stewart and his wife Eileen.
- The National Farmers Union for its hospitality and help.
- The various Government Departments - M.L.C., M.A.F.F., A.D.A.S. for their expert advice and help.
- David Gilchrist for his help and direction in getting my initial contacts.
- All those people who so generously provided hospitality all over Britain and Europe with a special mention to Kay and Arthur Adams who provided us with a home away from home.

I feel it would be remiss of me to write this Report and not mention the first six weeks tour organised by U.K. Director of Nuffield, Captain John Stewart. The participants in the tour were scholars from other countries and included fellow Australians Andrew Jones from Tasmania, Alan Grant and John Mandeno, New Zealand, Johnathon Palmer, Zimbabwee, and Francois Convert, France. We were also accompanied by Pat Nutt, Edward Renner, ex British Nuffields and Stephen Bulloch, U.K. Nuffield Director elect.

AUSTRALIAN NUFFIELD FARMING SCHOLARSHIP

1. INTRODUCTION

An introduction to the European Economic Community provided us with some very solid background.

To have an understanding as to why the E.E.C. was formed one has to remember the following - the older members of the community have seen Europe without enough food for its people to exist three times. The other reason is the desire for security to ensure there is no repeat of the horrors of the 1930-40's. The reasons for their heavily subsidised agricultural industry arises from this occasional shortage of food. Subsidies were introduced to encourage a rapid increase in food production which had the desired effect to the point that there is now over production of food in Europe. This has necessitated the introduction of various measures, such as quotas for milk, butter and cheese, which in turn has reduced the amount of beef as the majority of Europes beef comes from the dairy herds. There is a ceiling of 160 million tonnes of cereal. Production above this figure attracts severe penalties.

The latest attempts to curb production is the introduction of a program called "Set Aside"" which will operate from March, 1988. The European Parliament has set the following criteria for Set Aside:

1. It is compulsory for all member States to participate.
2. Producer participation is voluntary.
3. Participants must set aside a minimum of 20% of their arable land.
4. The duration of the set aside shall be a minimum of 5 years.
5. Compensation shall be based on the previous productivity of that land.
6. Enrollment of 30% of the farmers land shall provide exemption from the 3% co-responsibility levy on the first 20 tonnes of grain produced.
8. Set aside land shall be fallowed or extensively grazed.

Should a farmer wish to set aside his land permanently there are other schemes available e.g. farm forestry or wood lot grants.

It was generally agreed amongst the Scholars that this was a short term remedial measure unless the amount of land in set aside increased each year and is of a permanent nature. Otherwise the accrued benefits would soon be overtaken by increased yields on the remaining land through advances in technology.

It should be noted that agricultural price/income support in the E.E.C. and in the U.S. following the 81-83 Farm Bill has been on the increase.

	1980	1984	1985	1986
U.S. $B	2.7	7.4	17.7	25.8
E.E.C.				
E.C.U's	11.3	18.3	20.0	22.1 (now 66% of the E.E.C. Budget)

(E.C.U. is the international European community money standard and is equivalent in value to the U.S. dollar.)

Following our introduction to the E.E.C. via a trip to Brussells the H.Q. of the E.E.C. we were given a two week tour of south east England looking at all facets of British Agriculture. Once I got over the claustrophobia feeling of so many people in such a small area (55 million people in a land mass the size of Victoria the majority living in the southern half of Britain) the tour proved an ideal way to gain a greater understanding of the many facets of Agriculture and a general feel for the way British farmers pursue their chosen profession.

2. TREES

(a) General Review

My first impression of the treescape of southern England was one I was not prepared for - one of devastation. During October, 1987 the south of England had a storm with hurricane force winds, the likes of which had not been seen for more than 280 years. London had its highest recorded winds ever of 94 mph (246 kph) with gusts of 110 mph (284 kph) being recorded on the island of Guernsey.

The loss of life was minimised by the fact that the storm struck the south coast at 2 a.m. and left the east coast for the North Sea 5 hours later.

The Forest Commission estimate some 15 million trees have been lost including 40% of cricket bat willows 5% of Britains fruit trees, some from wind borne salt damage.

In the southern counties approximately 20% of all trees were down and millions of others sustained serious root damage leaving them suspect in the next storm. Following the storm many practices for saving trees were used. These included righting and anchoring fallen or partly fallen trees, lopping trees snapped off at close to ground level to allow regrowth, pollarding trees which involves cutting the trunk higher up on the trees that have suffered severe damage to the branches. It is envisaged it will take some 5 to 10 years to recover from this storm.

The next thing that became obvious was the multitude of Government and Semi Government bodies which are available to assist with advice and grants for the planting of trees on farms and other associated activities such as wild life habitat provision, growing trees for wood lots or amenity planting, growing trees with varied end use's, such as furniture timber, construction timber and fire wood (it should be noted that in some areas of Britain sold fuel is not allowed to be burnt because of pollution).

Direct Tree Seeding in Britain

The only direct seeding being done in Britain is by a Company called Cambridge Direct Seeding pioneered by its principal Alistair Luke.

The majority of his work is being done on hostile sites provided by past and present industries - coal and metal mining, extractive stone and sand/gravel quarrying, routine installations, dock yards, railway abandonment, and disuses urban buildings or land.

The planting technique used is to sow species that will create a natural succession of vegetation. It begins with early "nurse" species (e.g. cereals, legumes for nitrogen fixing) which ameliorate the harsh site conditions. These are replaced with pioneer species, e.g. birch, alder and pine and finally the long lived varieties like oak and ash. These will end up the dominant species.

It would seem important to achieve good results, so in most cases seed is pre-treated prior to sowing to achieve maximum germination. There are various methods being used:

- Pre stratified seed for some of the more deeply dormant seed.
- C.M.P. - a cold moisture pre-treatment.
- W.M.P. - Warm moist pre-treatment.

(b) Osmotic Priming of Seeds

Work undertaken by Mr. Chris Cox (Fluid Drilling, Stratford-upon-Avon) I believe this work has considerable merit in direct drilling applications in Australia.

The Principle :- Osmotic priming is a seed treatment technique which regulates water uptake by seeds during the germination process. By using a priming solution, the seeds are allowed to imbibe water to become physiologically active, but does not permit radicals to emerge. This enables the slower germinating seeds to develop to the same advanced stage as the faster germinating seeds.

The first solution used was polyethylene glycol but since then a simple salt solution has been found to be effective. Germination tests were carried out on 14 species of Eucalypt following osmotic priming, the best results being 95% of seed germinated within eleven days. This method along with the use of polymer ensure's the survival of the emerging seedling, and would with more research in Australia I am sure provide a surer method of direct tree seeding in this country. This would provide us in the long term with a far cheaper, quicker and practical method of establishing trees. This may also help to overcome the way we have conditioned ourselves to planting trees in straight rows uniformly spaced within the rows and between.

After osmotic priming the seed can be germinated in aerated water and sown or in some circumstances be sown before germination.

The table below indicates results of germination tests of Australian Eucalyptus Seeds carried out by Mr. Chris Cox of Fluid Drilling.

What is a Polymer?

It is a neutral chemical Polyacylamide which as the water absorbing capabilities of hundreds of times its own weight, thus acting as a water reservoir where it is needed at the plants roots. Soil and compost water holding capacity is greatly increased and the roots of the plant attach themselves to the gel particles and can extract up to 95% of the stored water as required over a prolonged period of time. The polymer gel should give several years of life as it has the ability to re-hydrate itself many times. I believe it has applications for use with direct seeding during our hot summers to overcome the periods of no rain which we encounter and thus remove the labour intensive job of watering.

The table below indicates the practical use of Broadleaf P4 water storing polymer in an orchard planting in Canterbury England. 1094 trees were treated, 834 were not. At the seasons end 2.3% of treated trees and 16.9% of the untreated group were dead. The results below indicated growth rate.

	Treated Trees	Untreated Trees
Central Leader Growth (total for 20 random trees)	826 cms (+191.87%)	283 cms
Side shoot growth (total for 20 trees)	1956 cms (+222.77%)	606 cms
Total new growth (for 20 trees)	2782 cms (+212.71%)	889 cms
Average Extension Growth per tree	139 cms (+212.71%)	44.45 cms

It is also interesting to note that as in Australia notice is being taken of the origin of seed i.e. the geographic location in which a stand of native trees is growing or the place from which a non native stand was originally introduced.

Providences:- is the geographic location in which a stand of trees, native or non native is growing.

I believe that as in parts of Britain, much greater use could be made in Australia of direct seeding, not only in the broad agricultural scene but also in the area of road cutting and filling, where the seeds can be placed in with the mulch as is sprayed on.

It could be noted here that in the opinion of a farmer in Hampshire, Mr. Charles Hall, there are no natural strands of timber in England, but there are what could be described as "semi natural ancient woodlands". In his view all standing timber has been planted by man or regenerated from the same. He also told me it took 3500 mature oak trees to build a British man of war, and those trees would have covered 900 acres some 400 years ago during the time Drake was fighting the Spanish Armada.

(c) <u>Seedling Planting</u>

What are the reasons British Farmers plant trees ?

- Agricultural Improvement
- Amenity Planting - community value
- Woodland - economic returns
- Native conservation - wildlife habitat
- Alternative income - set aside

The above headings are similar to the reasons that Australians plant trees except for the last one. However, in Britain, there are a multiplicity of grants available to farmers and land owners for tree planting. Free advice on tree planting is available from most organisations which offer grant aid. The existence of a well designed and approved scheme is a criteria for eligibility in most cases, however the availability of advice to make that plan seems to be less available than the grant.

Some of the Grants available include :

1. MAFF/WOAD Agriculture Improvement Scheme

- Does not have a plan as a prerequisite
- Grant available for shelter belts or single trees, provided that they offer shade or shelter for crop or livestock.
- Grant covers drainage, cultivations and site preparation,planting and maintenance for first 3 years, fencing and professional fees.
- Maximum payable up to 60% of above.

2. Country Side Commission - Amenity tree planting scheme.

- Available to landowners and tenants for planting on individual sites up to quarter of a hectare.
- May be paid for work to prolong the life of an existing woodland e.g. thinning, selective felling, restocking or protective fencing.
- Grants given where shown to be of community value, stream side planting, shade etc.
- Grant of up to 50% - administered by country councils, some of which give guards and trees in lieu of monies.

3. The Forestry Commission - Woodland Grant Scheme.

- Introduced April, 1988.
- Minimum area 0.25 hectares.
- Timber production to be one of the aims of planting.
- Multi species planting encouraged.
- Follow management guidelines.
- Minimum stocking rates 1100 trees/hectare for broad leaves and 2250 for conifers.
- Prior approval with 5 year management plan.

AREA APPROVED FOR PLANTING OR REGENERATION (ha)	RATE OF GRANT C O N I F E R £/ha	A$/ha	B R O A D L E A V E D £/ha	A$/ha
.025 - .09	1005	2211	1575	3465
1.0 - 2.9	880	1936	1375	3025
3.0 - 9.9	795	1749	1175	2585
10 and over	615	1353		

* Exchange rate current at time of writing.

- Grants paid in three instalments, 70% on completion, 20% and 10% at 5 year intervals.
- If arable or grassland planting but not planted under Scheme 7 then additional £200/ha (A$440/ha) payable with first instalment.

4. Woodland Trust - Licensed Planting Scheme

- The trust will undertake in chosen areas to plant and maintain for 25 years on private land native broadleaves. The only contribution by landowner is 75% of and fencing and vermin and noxious weed control. After 25 years the trees become the property of the landowner. The landowner must also provide access during that 25 years.

5. Nature Conservancy Council Grants.

   - Available to new projects enabling maintenance and management of sites and species of native conservation importance.
   - Grant aid up to 50% of total cost.
   - Voluntary labour may be costed in.

6. Storm Damage - Country side commission.

   - Not for clearance of damaged trees.
   - For cost of replacing lost trees and surgery to damaged trees of particular merit.

7. Ministry of Agriculture, Fisheries and Flood - the Farm Woodland Scheme at 20th May, 1988.

   This scheme is not likely to be introduced before the end of 1988 and is the British version of the E.E.C. Setaside, it is not a planting grant. The payments being made over a number of years.

   - Conditions
   - Restricted to arable land or grassland which has been improved and re-seeded within the last 10 years.
   - The highest level of payment for the best land will be £190 - A$418/ha to be paid annually.
   - Depending on the type of planting payments will be made to a maximum of 40 years for your hardwood (oak or birch) species.
   - Minimum area of 3 hectares, maximum of 40 hectares per any one holding.
   - The payments will be taxable as they replaced income from other sources.

From the figures provided to me, since the mid 1970's when the private sector had plantings of 7,000 hectares to 1986-87 some 19,400 hectares, it is very clear that the grant system has provided this enormous increase. The target for the private sector is 29,000 hectares annually, this being achieved by the aforementioned grants and publicity.

Tax shelters previously in force have now been removed. Future assistance, to be solely by grants, can in the governments view be better targeted and controlled. The income from any plantings shall be tax free, however expenditure during the growing period shall not be deductible against other income.

(d) Tree Shelters (Tree Guards)

One of the first things I noticed travelling around rural Britain were the tall 1.2 metre plastic tubes about 10 cm in diameter which seemed to be enclosing nearly all new plantings of trees, either on the road side or in the adjoining paddocks. Having seen nothing like it in Australia I thought them worthy of investigation. My initial research told me there were many types, and the following are some examples :

The single walled types
- corrugated drainage pipe
- plain P.V.C. water pipe - various colors

The twin walled construction type
- square
- hexagonal
- triangular
- some with folded top, some without
- an extruded round one end with an anti abrasion rim to stop barking of young trees.

Also
- the plastic mesh type both open weave and plastic covered.

There being too many for me to research, I contacted the British Forest Commission and was directed to their research establishments Alice Holt Lodge in Surrey and in Exeter. The following is a guide to tree guards in Britain with many of the points applicable to their application in Australia.

The technique of using treeshelters round recently planted broadleaved trees is now widely practiced throughout Britain. Trees inside shelters grow much taller than unprotected trees. Shelters also provide protection from mammal damage, readily identify the planting position and permit easier weeding with herbicides. A shelter life of about 5 years is desirable.

* Experiments on growing trees in vertical translucent or transparent plastic tubes (commonly known as treeshelters) started in 1979. These shelters create a favourable microclimate around a tree by acting as individual greenhouses and enhance height growth of many species of newly planted trees.

* Most shelters are 1.2m long to give protection against rabbits and hares and farm livestock. If only rabbit protection is required, short (60cm) shelters may be used but any growth response will be correspondingly less. Experiments are continuing on taller guards for cattle.

* Control of competing weed vegetation with herbicides is easier with much less risk of damage to trees protected inside the shelters.

* Treeshelters are now being adopted on a wide scale and it is estimated that over 6 million shelters had been used in Britain by the end of 1986.

(e) <u>Growth of Sessile Oak (Quercus Petraea) over 6 years</u>

Sessile oak were the first trees to be planted in shelters and Figure 1 shows height development of these trees over a period of 6 years. Treeshelters accelerate early height growth but the "fertility" and yield class of a site are not changed by shelters, but the trees grow more rapidly through the expensive establishment stage.

Figure 2 shows the effect of treeshelters on stem diameter development and stem volume over the same 6 year period. However, some recent experiments incorporating a very high standard of weed control (all weeds killed within one metre of each tree) have shown that good weeding alone can result in even better height and diameter.

A treeshelter should be left around the tree until it disintegrates naturally which should be after 5 to 10 years. Premature removal before adequate stem thickening has taken place may lead to stem snap or the need for some continuing support of the tree. In the original experiment, trees that had been in treeshelters for only 3 years were able to stand without support 2 years after the shelter was removed.

(f) Response to treeshelters by other species

Nearly all broadleaved and most coniferous species show improved height growth when inside treeshelters. Appendix I indicates the kind of response which can be expected by species.

Figure 1

Mean height of Oak transplants

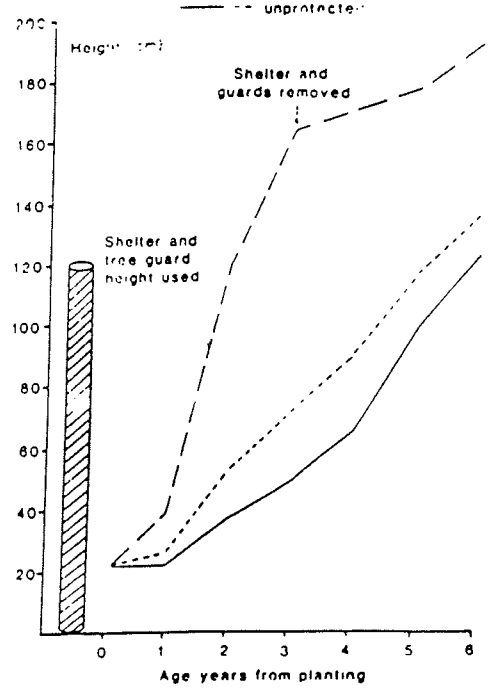
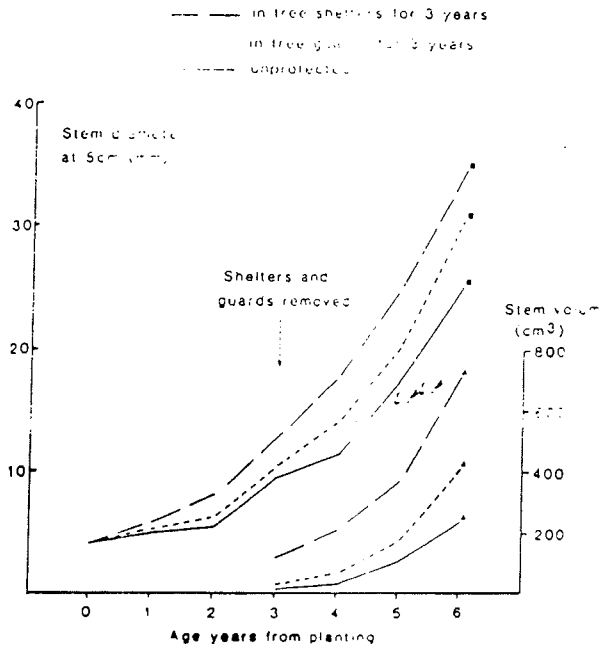


Figure 2

Mean stem diameter at 5cm and stem volume growth of Oak transplants



(g) Treeshelter materials

A treeshelter life of at least 5 years is desirable so that the tree can grow out of the top and produce an adequate stem. Ideally a treeshelter should provide a greenhouse effect for the first 2 or 3 years and then continue to give support and protection for another 2 or 3 years while the stem thickens.

Any clear or translucent plastic can be used to make a treeshelter and several commercial shelters are now on the market - see "Treeshelters - A guide to their use and information on suppliers" - (Appendix II)

(h) Foliage damage, pests and diseases

Temperatures up to 48 degrees celsius have been recorded inside treeshelters but this has not caused any visible damage to the trees except for browning of some leaves pressed flat against the shelter surface. During the growing season the relative humidity inside the shelter is consistently high and at 100% for much of the time.

This "tropical" microclimate has not led to any increase in pest or disease problems, indeed there is for example evidence that oak mildew damage is reduced. The only possible exception has been with beech (Fagus sylvatica) which was defoliated on one very exposed site and suffered 10% mortality during the wet summer of 1985, but generally even this species grows well in treeshelters in later years.

(i) Some Problems

Occasional reports have been received of birds falling into treeshelters and dying. These have been very infrequent and, overall, the incidence has been no more than one death per 5000 treeshelters. The problem can only occur in the first one or two years before the trees have grown out of the top and probably only for shelters with a thick rim.

Once trees emerge above the top of the treeshelter some types of shelter may rub and fray the bark, which may cause a long term weakness in the tree. The problem can be reduced by tying the tree to one corner of the shelter, stuffing straw in the top, or using the prevention devices available from suppliers. The problem is worst with large crowned trees on exposed sites with treeshelters which have an abrasive top edge. Most modern designs avoid the risk of damage to young trees.

Some of the older square corrugated polyprophlene treeshelters have split down the corners after 3 or 5 years. This deterioration is worst on exposed sites and where trees have rapidly grown out of the shelter and begun to sway in the wind. The problem is much less likely to occur with treeshelters purchased today.

On the whole, vandalism to treeshelters has been slight. Breaking or pulling-up stakes have been most common; use strong stakes if vandalism is considered likely.

As treeshelters disintegrate there will be plastic litter which may prove unsightly in amenity plantings.

(j) Summary

According to Mr. Dave Rogers, Research Officer in Charge of the Tree Guard Project at the Forest Commission's North Skye Research Farm, in Exeter, of all the tree guards tested since 1979, the only guard worth continuing research is a recent design which is extruded in twin wall material, has a niche to accommodate a stake, a flared top and pre-placed nylon ties. The material is expected to last at least five years. The guard was developed by a company called TUBEX after repeated consultation with the Forest Commission they were the only company to do this, and now produce a superior product.

It was after following all this information that I made the decision to approach the company with the view to importing the guard into Australia, as we had nothing like it here. The use of this guard in Australia, I believe, has enormous potential. By way of endorsing the faith I had in the shelter I planted Euc. Camaloulensis (red gum) seedlings 25cms high in 1.2 metre shelters on the 24th of September, 1988, the first of these emerged over the top on 20th December, 1988 having achieved a growth of 95cms in 87 days. An incredible growth rate!!

3. DEMONSTRATION FARMS

In 1974 the Countryside Commission published the results of the new Agricultural Landscapes study. This study showed a considerable loss, or poor management, of many features which make up the traditional English Countryside - small woodlands and copses, marshes, ponds, water meadows, unimproved down land and hedges - mainly through the adoption of modern farming practices.

Following this report in 1975 the Countryside Commission decided to establish a series of demonstration farms throughout England and Wales to investigate.

a) Whether it is possible to combine profitable farming and conservation interests and,

b) The most cost effective ways of managing both existing and new landscape features.

I visited one of these farms, "Kingston Hill" tenanted by Paul Christensen and his father, to see how they had managed to achieve a marriage between farming and conservation. This was of particular interest to me, being a participant in the Victorian Potter Farmland Plan Demonstration Farms I was keen to see how the Project was set up and what monitoring was being done. The following is my interpretation of an interview held with Paul Christensen.

At the beginning of the Project a "Snapshot" of the Farm was taken, an inventory of all wild life present. Then all groups which claimed an interest in the land were asked to draw up a plan of the Farm to maximise their own particular interest. These included, the farming interest, ornithological groups, landscape groups, the county council, who looked at the farm from a recreational point of view, right down to people looking at slugs and snails, small mammals and wild flowers etc. These groups then got together and drew up a multipurpose plan to best suit all interests. It was found a lot of common ground existed, and also the common realisation that throughout all of this the farm had to remain profitable. Funding for the project came from three sources :

a) Existing grant aid systems.
b) The Christensens and then landlords St. John College for the balance of grant aided works and the full cost for items which did not qualify under existing aid schemes.
c) Special projects budget from the Countryside Commission, Ministry of Agriculture, Fisheries and Flood and the Forestry Commission - most of these funds were for small scale trials.

A Steering Committee was set up to oversee the project and consisted of representatives of the Countryside Commission, National Farmers Union, Ministry of Agriculture, the various interest groups. A multipurpose plan was devised seeking to embody into what were intensively managed profitable farms a wildlife and landscape interest. This involved looking at activities which could be carried out to achieve that end, using low cost maximum effect measures rather than large amounts of capital injection. Following the initial small capital expenditure the annual cost is not very high, but rather has been an attitude change, related to how the farmer carries out his day to day farming operation.

One example of cost saving was the decision to change the way fertiliser was spread and not to spread fertiliser into the hedgerows. This practice has seen the disappearance of weeds and the re-introduction of wild flowers, as well as reducing the annual fertiliser costs by 2.1/2 percent. This practice also fitted in well with the conservation ideal of reducing fertility in areas of wild life habitat and secondly managing those areas as cheaply as possible whilst at the same time trying to raise the fertility of the productive areas as much as possible.

The Christensens have set aside 4 - 5 percent of their farm in various forms. They see this land as land they have lost income from, but are now receiving some benefits in the form of shade and shelter. The species planted are generally indigenous with preference to those that carry the largest number of invertebrates and so increase the food chain. The oak as a tree carries the largest number of non vertebrate and so is a very important species. The main purpose of the project was to see if you could embody these objectives into managing an area of land, then primarily to demonstrate that to other people.

So each year a series of farm walks are organised for interested farmers and students. Students also carry our specific projects. One of the things that has been learnt is the importance of a diversity of habitats to cater for many different species of wild life.

Summary

I believe the countryside Commission missed an enormous opportunity by not injecting some very real capital funds at the beginning of the project to show farmers what could be achieved if carried on over a very much longer period on their own farms. I believe that here in Australia we have done that with the Potter Farmland Plan Farms but have missed the point in failing to monitor and record the wild life at the beginning of the projects, as they did in Britain. Perhaps we have not had enough input into our farm plans from single interest groups, however I believe overall our planning of land use management is more advanced, but then perhaps it needs to be. Considering that the farm in question, "Kingston Hill" has been in use in some form or other since the saxon period of 410 AD, it is still surviving very well. The same cannot be said for some of our land in Australia which has only been used by Europeans for two hundred years.

BEEF CATTLE

(a) SIMMENTAL

My scholarship also included looking at Simmental Cattle and other breeds with a view to crossing. I very quickly made up my mind, after having seen the quality of British Simmentals that the best course with our own Simmentals would be to get them to the pure stage as quickly as possible.

I visited Simmental Studs in England, Scotland and Ireland and although generally the herds were small the quality was very good, the cows being very well boned and well fleshed with good muscle characteristics. It appears to me they are not as tall as the Australian cattle, but perhaps this is due to our North American influence.

Apart from visiting private farms I was fortunate to visit the North of Scotland College of Agriculture at Aberdeen and spend some time with Dr. Peter Broadbent who is in the process of conducting research into Multiple Ovulation Embryo Transfer (M.O.E.T). This involves rapid generation turn around to enable progeny testing to be completed in a far shorter period than would otherwise be possible.

The Simmental Society were approached along with some other breeds to participate in the Scheme. The breed society agreed to provide some 60 cows with over 30 studs participating by leaving one or two of their elite cows to begin the scheme. I also spent some time with Mr. Tom Evans, International Marketing Manager for the British Milk Marketing Board, visiting a semen freezing unit at Stunminster-Newton in Dorset. Of all the bulls there, 3 particularly impressed me with their bone and fleshing. These being Stirline Rapier, Yanley Lysander and Newfield Picador.

During my stay in Europe, I was able to visit farms in Switzerland and Austria as a guest of the respective Simmental Societies. My notes on this part of my trip are incomplete as my Field Note Book was stolen along with other belongings from our car in Berlin - a warning to all travellers (as we have all been told before) - don't leave anything in your car unless you're there with it.

At the Headquarters of the Swiss Society in Zollikofen I was introduced to the Swiss organisation by Mr. Alfred Ruegsegger, who went on to explain that the Society work in close co-operation with the A.I. organisation. Thirty percent of Swiss Simmentals are registered and recorded. Recording is by random visits approximately once a month with the farmer contributing 15% of the cost and State the remainder.

I then had the opportunity to visit some cattle on their mountain pasture. Mr. Arnold Kunz Ritter from Oey in the Diemtigen Valley which is next to the Simme Valley, where the breed originated, was our host for the day. He explained the cattle were kept housed in the valley all winter and taken to the mountain pasture in late May, early June, after the cessation of frosts and kept there until November. They would be housed during the day and allowed to graze out at night. Being a dual purpose breed the calves were removed from their mothers at 10 days and the cows milked. On Mr. Ritters farm 15 cows were milked by machine, a recent innovation and the cow man would make one emantalle cheese of about 5 kgs every day using traditional methods. The cheese would be delivered to the local co-operative once a week. It was interesting to note udder conformation was not as good as I would have expected due to the recently ceased practice of hand milking and attention to udder shape for that purpose.

Austria

My visit to farms in Austria was organised by the Director, Dr. O. Foger at Simmental Headquarters in Ried. The first farm visited was involved in breeding bulls and had cattle similar to the type I was used to seeing in Britain. Once again a very small herd - 20 cows and replacements. These cows were however grazed outside on grass with the bulls being tethered inside and fed silage. This farmer had very good cattle having won many prizes including the Grand Champion cow of Austria.

The next farm was a complete contrast cattle wise, still pedigree Simmentals, but bred for milk production. These cows were housed all the year round and during the spring while we were there were fed green grass freshly cut twice a day, the rest of the year silage and concentrates. This was done to maximise the grass available, the individual cows were tethered and bedded on straw, with the milking machine being wheeled to each cow. The cattle, because of the constant handling, were very quiet and appeared contented. A feature of this farm was orderliness, neatness and cleanliness, apart from a swallows nest in the parlour, which was considered to be good luck, so were not to be removed or disturbed under any circumstances. The friendliness and hospitality we encountered in these countries and the efforts made by them to help overcome the language difficulties was outstanding.

(b) SOUTH DEVON

I visited two South Devon Studs in Devon and talked to many people about the breed. I have drawn the following conclusions and I am sure no South Devon Breeder will agree with all of them.

They appeared to me to be very large cattle of the late maturing type hence not suitable for crossing or for the production of beef for the export market such as Japan which requires earlier maturing cattle to reach the required weight at a given age. The breed is a very old one, and the impression I got was that it is being kept by a few traditionalists for sentimental reasons. The number of South Devon herds in Britain has declined markedly over the last 20 years with the introduction of the European breeds.

(c) BELGIUM BLUE

If there is one single event of my trip which will stay with me it would be my first viewing of Belgium Blue Cattle at the Paris Show. An incredible sight with enormous muscular development and carcase yield. This breed has had an enormous impact on the British Beef industry with Friesian Blue X calves making £400/A$880 at 3 weeks of age and now has one of the best semen sales of all breeds in the U.K. I believe the potential for this breed in Australia would be cross breeding as in its pure form has many calving difficulties with a majority of births being caesarean section. This breed is covered in more details in the 1987 Report of John Fry from Western Australia.

AUSTRALIAN NUFFIELD FARMING SCHOLARSHIP

EFFECTS OF TREE SHELTERS ON GROWTH BY SPECIES

APPENDIX

Species[a]			Overall growth response[c]					
Common name	Scientific name	No. of experiments where present[b]	(1) Very good	(2) Good	(3) Initial	(4) Some	(5) None	Comments
BROADLEAVES								
Alder, common	Alnus glutinosa	7			x			
" Italian	A. cordata	2				x		
Ash, Common	Fraxinus excelsior	3		x				few early experiments
", Narrow leaved	F. angustifolia	3				x		
Beech	Fagus sylvatica	9	x					occasionally slow or poor response
Birch	Betula pendula	10			x			
Cherry	Prunus avium	4			x			rapidly grows out of shelter
Crab apple	Malus sylvestris	3		x				
Eucalypts	Eucalyptus gunnii	1					x	rapidly [illegible]
Hawthorn	Crataegus monogyna	5	x					
Holly	Ilex aquifolium	2		x				
Hornbeam	Carpinus betulus	3		x				variable, site sensitive
Horse chestnut	Aesculus hippocastanum	1				x		
Lime, large-leaved	Tilia platyphyllos	7		x				often very good response
Lime, small-leaved	T. cordata	1	x					
Maple, Field	Acer campestre	5		x				variable
", Norway	A. platanoides	2		x				variable
Oak, Pendunculate	Quercus robur	2	x					
Oak, Sessile	Q. petraea	many	x					one or two trees often fail to respond
Oak, Holm	Q. ilex	1		x				
Rowan	Sorbus aucuparia	6			x			
Southern beech	Nothofagus							
" Dombeys	N. dombeyi	3		x				variable
" Roble	N. obliqua	3		x				(very variable, often dieback
" Raoul	N. procera	8				x		(then good recovery. (Site sensitive
Sweet chestnut	Castanea sativa	4	x					Tending to rapid initial response only.
Sycamore	Acer pseudoplatanus	8		x				
Walnut, Black	Juglans nigra	3		x				(Both species very site
", Common	J. regia	3		x				(sensitive.
Whitebeam	Sorbus aria	3				x		
Wingnut	Pterocarya x rehderana	1				x		
CONIFERS								
Douglas fir	Pseudotsuga menziesii	3		x				
Grand fir	Abies grandis	5				x		
Japanese larch	Larix kaempferi	5			x			
Pine	Pinus							
" Austrian	P. nigra var maritima	8		x				Branches constricted
" Bishop	P. muricata	5		x				Site sensitive
Red cedar	Thuja plicata	8		x				Site sensitive.
Spruce, Norway	Picea abies	3		x				(both very variable in their
", Sitka	P. sitchensis	5		x				(response
Western hemlock	Tsuga heterophylla	8					x	Significant response on only one site.
Yew	Taxus baccata	3		x				Still very slow growing!

Footnotes

a) Omission of a species from the list should not be interpreted as being unsuitable for growing in tree shelters; it simply has not been formally evaluated.

b) Mostly experiments specifically comparing species' performance in tree shelters. There are many other experiments with shelters and now a considerable amount of field experience but mostly with the main forest species.

c) Overall growth response -

1. Very good. Species showing consistently good response to shelters, usually more than doubling rate of height growth in first 2-3 years after planting.

2. Good. Generally show a significant improvement in growth on most sites but not as marked as in 1.

3. Initial. Species which initially respond well to shelters but, because of early emergence from the top (end of first or during second year) and naturally fast growth anyway, do not sustain a large significant improvement beyond the third year.

4. Some. On average growth appears somewhat improved by shelters but either there is great variability or, in the experiments in question, the improvement was not statistically significant.

5. None. Shelters confer little advantage, or may even be detrimental.

SHELTER QUESTIONS AND ANSWERS

Mark Potter, Silviculturist, Forestry Commission Research Station, Alice Holt Lodge

Each year I receive a large number of queries about all aspects of treeshelter use. Some of these questions arise repeatedly and below I try to answer the questions that seem to occur most frequently.

Q What happens when the tree emerges from the treeshelter?

A The most obvious effect is that height growth reverts to a normal rate (see graph). It rarely drops to below that of unsheltered trees on the same site. At the same time, diameter growth and root development increase rapidly. Provided the tree possesses good apical dominance it will usually continue to grow straight with a good single leader.

Q When should I remove my treeshelters?

A Don't unless the shelters are themselves causing problems such as stem abrasion. Treeshelters are designed to decay naturally after 5-10 years: as they do so you may wish to collect the fragments to prevent litter.

Q What happens when the treeshelter breaks down?

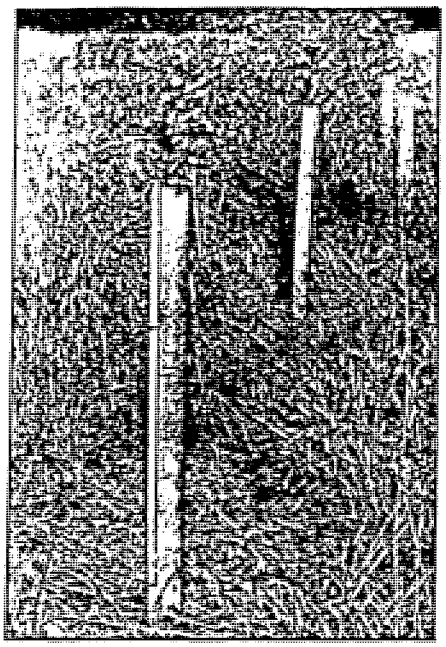
A Modern treeshelters should last at least five years, by which time the young trees should be self-supporting. Some early designs broke down sooner than this and the elongated stems flopped out through the split corners, necessitating costly and troublesome repairs to the shelters.

Q How close should I plant if I use treeshelters?

A Treeshelters have surprisingly little influence on this aspect of establishment. The enhanced height growth is shortlived, canopy closure being advanced by perhaps two or three years, and will have no long-term effect. Survival is generally improved with shelters but poorly-established crops raised without shelters are usually beaten up until a satisfactory stocking of at least 80% is achieved. Thus the greatest contrast in stocking will be between a fully stocked sheltered plantation and an 80% conventionally established area.

If it is accepted that a stocking of 2000 trees per hectare (*ie* 80% of 2500) is considered an acceptable result from 2m planting and 880 trees per hectare (80% of 1100) from 3m planting then these stocking rates could be achieved by planting at 2.24m and 3.35m respectively using a technique that guarantees 100% survival.

But treeshelters cannot be relied on to accomplish this and the stocking rates aimed for after beating up conventional planting may not be greatly dissimilar, so the real differences are much less marked and the justification for increasing plant spacing with shelters so much less convincing. Treeshelters alone are certainly not a justification for extending spacing from 3m to 3.5m.



Oak transplants after one-and-a-half growing seasons in 1.2m treeshelters.

Q How large an area can I plant using treeshelters?

A This question has already become 'an old chestnut'.

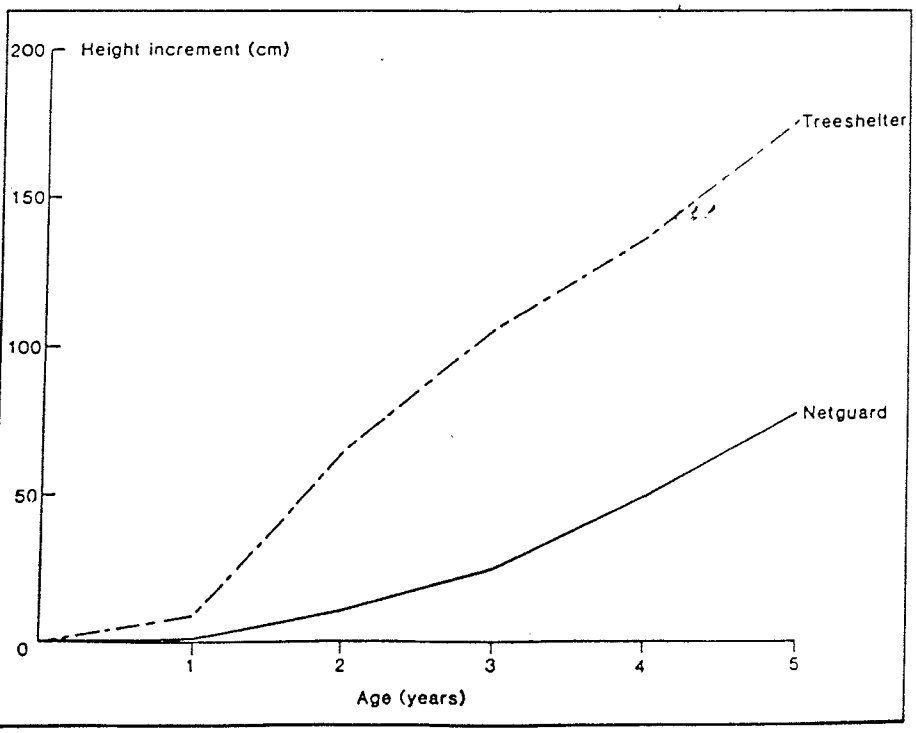
Although the increased growth rates are the most publicised effect of treeshelters they are really just 'the icing on the cake' for the forester, the main benefit probably being the convenient and secure protection offered by this technique.

Thus the first calculation a forester must make is the comparison between conventional fencing and using treeshelters. The break-even point will vary depending on the cost of fencing, the shape of area to be planted and the plant spacing.

The additonal benefits offered by shelters, such as cheaper weed control and the shortened establishment period also serve to increase the size of the area on which this technique might be considered for use.

Q Do I need to weed trees in shelters?

A Yes. Treeshelters are not a substitute for weed control and neither are they a cure for poor plants, bad handling or unsatisfactory planting.



Growth of oak transplants in treeshelters and plastic mesh guards in an experiment at Exeter.

Q Don't treeshelters also help weeds?

A They certainly can and it is not uncommon to see a tree in a shelter apparently being smothered by dense grass. However we have assessed the effect of controlling weeds within shelters and discovered, to our surprise, that this does not significantly improve the growth of the trees.

Q Is one type of treeshelter better than another?

A We have compared all designs, materials and colours and have concluded that one shelter is likely to be as effective as another in promoting tree growth. A treeshelter must be reasonably translucent, it must have a life expectancy of at least five years, a smooth top to prevent stem abrasion and a method of attachment that does not enclose the tree with wire. Choose the shelter that you find most convenient to use from those that fulfil all these requirements.

Q Do the dark coloured shelters affect tree growth?

A In experiments on open sites, light-demanding species have grown slightly taller in brown shelters but this observation is unlikely to be of any great importance in practice. Where shelter colour may become significant is in underplanting or enrichment where light levels are already low. In this case it would be advisable to use a more translucent material.

Q How tall should a shelter be?

A The original shelters were 1.2 m tall because around Alice Holt the main animal problem is with roe deer and a shelter of this height will prevent browsing by this species. Where there is no deer problem smaller shelters can be used with many of the benefits of a 'full size' shelter but at lower cost. Conversely, if red, fallow or sika deer are present shelters must be 1.8m tall.

Q What size of stake should I use?

A 25mm square treated softwood seems to be the smallest sensible size but on stony soils, restocked sites or exposed areas this should be increased to 30mm or 35mm. Cleft chestnut appears to be a good and cost-effective alternative.

Q What type of planting stock should I use in treeshelters?

A Although JPPs have sometimes done well, results from experiments suggest that a departure from normal good practice should not be necessary. Good, sturdy 1+1 transplants are ideal.

Q Do conifers 'work' in shelters?

A Most of the conifers we have tried have responded very well, the exceptions being *Tsuga* and *Abies*. There is no fundamental difference in the application of treeshelters to conifers; the question is again one of scale.

Q Does the warm, humid environment inside a treeshelter increase the risk of disease?

A At the moment we are not aware of the link between treeshelters and diseases but it does appear that beech, grown in shelters is more prone to infestation by *Phyllaphis fagi* (beech woolly aphid) than unsheltered trees. Until we find a simple solution to this problem it is probably advisable to use a different method for protecting beech.