AUSTRALIAN NUFFIELD FARMING SCHOLARS ASSOCIATION

REPORT OF VISIT TO THE UNITED KINGDOM

By W. McL. Poynton
(Victoria 1982 Award)
(Victorian Sheepgrower Award)

A study of recent work on Pasture Renovation practices in the United Kingdom.

Royal Agricultural Society of Victoria, Royal Showgrounds, Epsom Road, Ascot Vale, 3032. Telephone: 376 3733.

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My wife, Judy, and children who joined me for the latter portion of the visit, also extend their gratitude to the many people who assisted us all, the kindness of Mrs. Stewart in particular was greatly appreciated.

To members of my family and others who kept the farm running during the period I was absent, I extend praise and thanks.

AUSTRALIAN NUFFIELD FARMING SCHOLARSHIP TRUST

Report by

W. McL. POYNTON

(Victorian Sheepgrower Award,1982)

REPORT ON VISIT TO THE U.K. INCORPORATING STUDY OF RECENT WORK ON PASTURE RENOVATION PRACTICES IN THAT COUNTRY

"The land is in short, open and available in its present state, for all the purposes of civilized men. We traversed it in two directions with heavy carts, meeting no other obstruction than the softness of rich soil; and in returning over flowery plains and green hills, fanned by the breezes of early spring, I named this region Australia Felix, the better to distinguish it from the parched deserts of the interior country, where we had wandered so unprofitably, and so long".

Sir Thomas Mitchell, 1836

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INTRODUCTION

From the earliest days of Australian exploration man has sought improved grazing for his animals - hence Sir Thomas Mitchell's exuberance with the discovery of his Australia Felix. The squatters that followed recognized that the large tracks of native pasture would be the basis of their wool growing enterprises. Better grazing was to come to future generations though. Today the grazing industry's structure in Australia is that approximately 22% of the sheep are found in the Pastoral Zone, i.e. the semi-arid parts present in all mainland states except Victoria; 44% in the Wheat/Sheep Zone and 33% in the High Rainfall Zone.

Reflecting briefly on developments in the last 30 years of grazing helps to bring today into perspective. The 1950's saw closer settlement in many areas and assisted by sub-clover, superphosphate and post-war wool prices, the pastoral industry boomed. In the 1960's Anthelminics became available which gave unprecedented success in the control of intestinal worms and animal health improved and in general stocking rates increased. In the 1970's the industry

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gave increased emphasis to fact over fancy in the selection of their stock and performance continued to improve. Each of these probably had their greatest effect in the Wheat/Sheep and the High Rainfall Zones. Today, questioning is going on in large areas of these zones as to not whether but why pastures are not seemingly producing what they did during the early part of this period of expansion. While the Agricultural Scientist, Plant Breeders and commercial enterprises are actively following up the subject, pasture renovation is at the front of a large number of sheepmen's minds as they enter the '80's. The high cost of renovation or unsuccessful renovation will possibly lead to further cropping in those areas which are suitable - it was stated in 1982 by the then Victorian Minister for Agriculture, Mr. Tom Austin, that for example, in the Western District of Victoria, 1.4 million hectares of land currently used for grazing was considered suitable for cropping.

Pasture renovation can consist of:

1. Upgrading existing native pasture;
2. Strengthening existing sown pasture;
3. Sowing completely new pasture.

All of these take place as a matter of course on farms both in Australia and elsewhere and this report concentrates on recent pasture removation activity in the U.K. which may, in the future, have influence in Australia - particularly in the High Rainfall Zone.

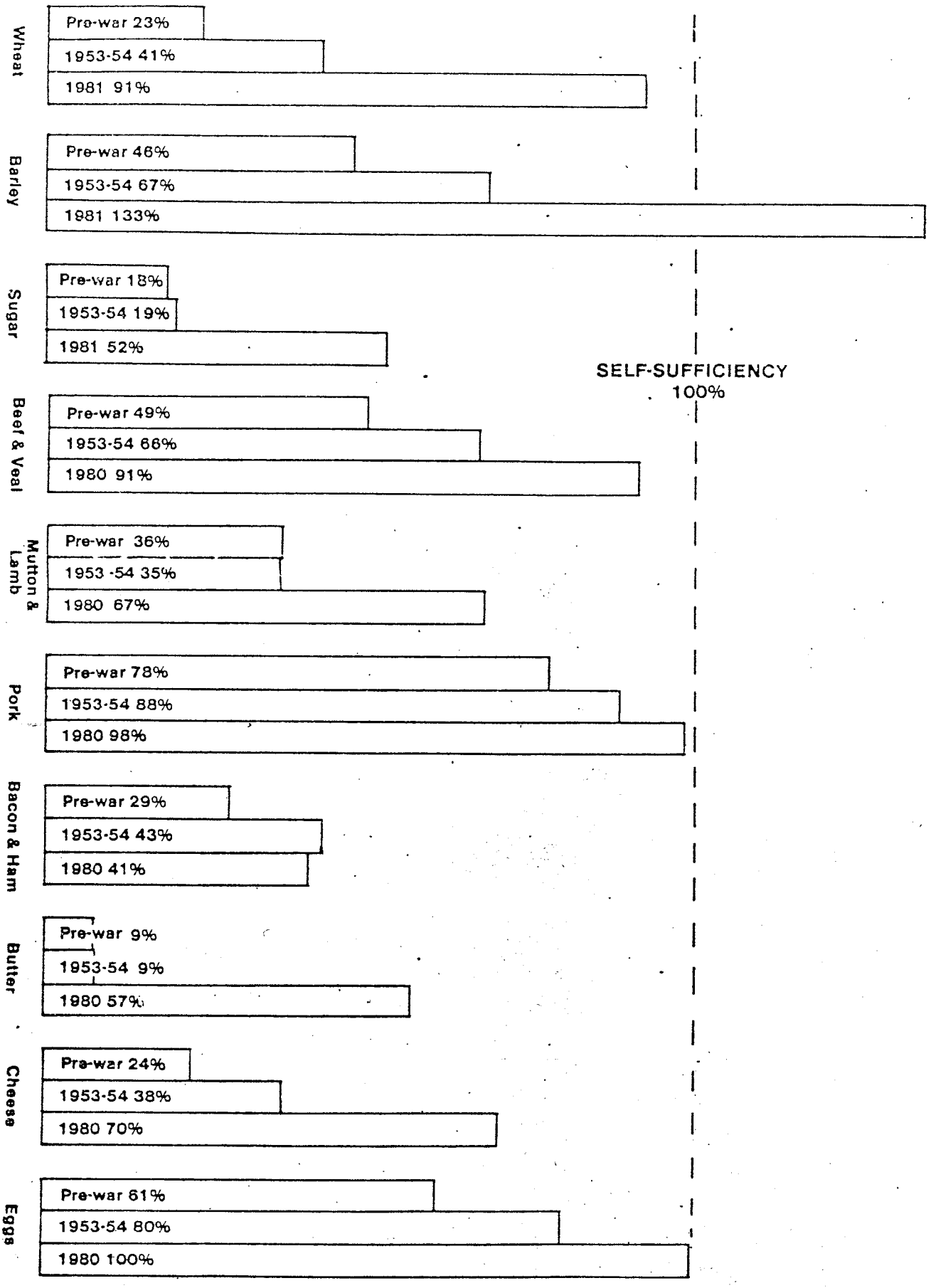
A look at some of the reasons why U.K. farmers can spend the money and effort they do on producing their agriculture is interesting.

BRITISH AGRICULTURE

One has to be impressed with British agriculture's progress. Since the end of the Second World War it has more than doubled its output despite losing approximately 40,000 acres per year of some of its best farm land to urban development, factories, new roads and reservoirs. Because it is spread over the countryside, farming does not appeal to the casual observer to be a particularly large industry, surprisingly its output of 8,800 million pounds in 1980 was greater than the entire U.K. motor vehicle industry - 7,500 million pounds. As a source of direct employment agriculture provides work for 650,000 people.

Altogether some 2 million people - 8% of its total labour force within its population of 56 million, rely for their jobs on the productive capacity of Britain's farms. Between 1970 and 1980, Britain's self-sufficiency in all foods increased from 47% to 60% and in the types of foods it can grow in its climate, from 59% to 75%.

DEGREE OF UK SELF-SUFFICIENCY IN VARIOUS PRODUCTS - PRE WAR (1936-39), 1953-54 and 1980-81



THE EUROPEAN ECONOMIC COMMUNITY AND THE COMMON AGRICULTURAL POLICY

Two world wars have emphasised the vital importance of maintaining a healthy and productive agriculture to the U.K. populace and its people seem to be willing to continue to pay heavily from their own pockets by even now participating in the E.E.C. To understand better why the U.K. farmer can carry the costs and make the profits he currently is, a look at the complicated E.E.C. pricing structure is in order.

Under the Common Agricultural Policy (the CAP), the farmer is guaranteed prices close to those which the consumer is paying in the E.E.C. Import duties are collected on any food imported into the Community at prices lower than those internally set by the E.E.C. and are paid into the Common Agricultural Fund. Any assistance to farmers to maintain their viability is paid out of this fund. At the same time, a "bottom" is put into the market by fixing what are known as intervention prices at certain agreed levels for different commodities. They operate when the free market price within the Community drops to those levels. In practice, Intervention Boards then buy up the commodity in question from farmers and put it into what is termed "intervention". Intervention buying can lead to the piling up of large surpluses of certain commodities ("mountains" of butter or "lakes" of wine come readily to mind) in the intervention "bank". Ultimately, these may have to be disposed of (before they deteriorate) on the world market at much lower prices than were originally paid for them.

Australia's grievance with the E.E.C. is of course due to our declining market outlets for "economically" produced food as much as our loss of markets to the E.E.C. countries themselves.

A further complication of the E.E.C. system concerns the different values of the national currencies of the member nations. As a result, the value of different foods is calculated in units of account, a notional form of common currency, or "green pound". To make the system work, monetary compensatory amounts or m.c.a's are used. This is a device for compensating for the differences between a national currency value and the current value of a unit of account.

This highly complicated system makes it almost impossible to forecast with any degree of certainty the likely future level of farm prices.

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Decisions made on prices are influenced by political motives at any given time by individual countries.

At Brussels the privilege of sitting in on the Agricultural Committee of the European Parliament whilst it was debating amendments to the long drawn out 1983 pricing structure amply illustrated this with its countries representatives, M.P.'s and its multi-language translators requirements. Its a wonder that a decision is often reached at all. It was an illustration of one of the main reasons for the E.E.C.'s being - the not often stated but subtley recognized role of having these Western Block countries talking with one and another in an arena where decisions will ultimately be made peacefully. Even after agreement has been reached countries are quite likely to subtley interrupt the free trading between the E.E.C. countries by invoking customs or other regulations to their own benefit. The means to counter these is often immediate by retalitory measures or long by European judical decision.

Government and E.E.C. Assistance Schemes still flourish in varied forms. U.K. Agriculture and Horticulture Grant and Development Schemes grant aid around 22½% for a range of capital improvements such as farm buildings but go as high as 70% for field drainage in less favoured areas. E.E.C. grants for sheep are around a minimum of Four Pounds and Twenty Five Pence per head (maximum Fifty Four Pounds per hectare) with cattle at Twelve Pounds Thirty Seven Pence and ranging to Forty Two Pounds, Fifty Pence a head on eligible Hill Country Livestock (max. Sixty Pounds per hectare). Even after this, gross margins are comparative to many Australian enterprises because of the high inputs now used - the price received assurance though makes agriculture currently so attractive.

THE FARMING ENVIRONMENT

It is difficult to describe an "average" sized U.K. farm today but 100 hectares is often used as a yardstick. It is a fact though that 50% of U.K. agricultural output is produced by only 15% of the total number of farmers. Land prices (1982) range from One Thousand Pounds to Four Thousand Pounds per acre (English One Pound = Aust.$1.70). Changing patterns in recent years sees over 60% of the land now worked by owner occupiers, illustrating a reduction in the number of tenanted farms. Tenants rent ranges from Fifty Pounds per acre upwards.

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In mid 1982 farmers were receiving up to Forty Pounds for fat lambs, One Pound per kilo for 1½ year old grainfed beef and One Hundred and Fourteen Pounds per tonne for wheat.

Climate and soil are very largely responsible for the types of farming to be found in any country, while market opportunities and the likes and dislikes of farmers also influence what is actually produced on individual farms.

The principal climatic factors are not only the amount and distribution of the rainfall, but also the temperature and how it varies, the humidity and the hours of sunshine during the growing season. The type of soil has a most important bearing because it affects the kind of crops that can be grown and the cost of producing them.

For such a relatively small country, Britain has astonishing variations in rainfall, ranging from 2,500 mm in the mountains of the West to 500 mms in parts of the Eastern countries. Soil types are also extremely variable - from light sands to heavy clays. The interaction between rainfall and soil type is a key factor in determining what crops are grown. For example, it may be uneconomic to bring a light sand in a dry area into cultivation whereas, under high rainfall conditions, a similar soil could be made very productive.

Temperature changes are not extreme in Britain due to its island climate, but plant growth in the North and on land at higher altitudes does tend to be late in spring owing to the low temperature of the soil. The higher temperatures that are needed to bring crops to maturity are more common in the East and South.

The main arable areas are therefore found mainly in the East, in the Midlands and in the South of Britain, though some coastal belts and low-lying areas in the West may also be suitable. Where the rainfall makes arable cropping risky or impossible, grassland for the production of livestock predominates, for a reasonably high and well distributed rainfall favours the growth of grass. For this reason, animal production - for both meat and milk - is the main type of farming in Western Districts, possibly with some small areas of arable land used mainly to produce feed for the livestock.

THE ROLE OF GRASSLAND IN BRITISH AGRICULTURE

This table sets out in global terms the way in which land is used for farming purposes in the U.K., and the importance of grassland in the agricultural economy.

Agricultural Land 1980
('000 hectares)

	ha
Land devoted to tillage (arable cropping)	5,036
Grassland under 5 years old	1,982
Grassland 5 years old and over	5,138
Rough grazing (mostly hill land)	6,293

Grassland is generally separated into two categories; permanent and temporary. Permanent pasture (or meadowland) is grassland which is never ploughed and re-sown and, of the 7.1 million hectares of pasture in the U.K. (excluding hill grazing) some 5 million hectares fall into this category. Temporary grassland, on the other hand, is grass which is re-established by sowing grass seeds from time to time, usually as part of a rotation involving other crops. This temporary grass, known as a ley, will stay down for periods varying from one to eight years, though anything older than five years is now classed as permanent.

Each category has its advantages and disadvantages. The advantage of permanent pasture is that no cost is involved in establishing it. It is there for 365 days in the year; it maintains a tight surface of plants and a firm mat of grass roots which help to prevent the hooves of grazing animals treading into the surface (referred to as "poaching.") It is also more likely to persist in a drought. But, in general, it is not quite as productive as a fresh, young ley and is liable to include a proportion of relatively unproductive grasses. Temporary grass (for both grazing and mowing), on the other hand, provides very vigorous growth and a high yield for the first three years after establishment, but it can be expensive in terms of seed and cultivation costs to establish. It does not carry livestock well in wet weather, so a lot of damage can be done to the surface if the stocking density is high. In the West there is a much larger area of permanent pasture while on the larger arable and mixed farms

of the Midlands and the South there is more temporary grass.

Britain also has a very large area of hill and upland grazings - amounting to 6.3 million hectares - which are, of course, permanently in grassland of a sort (i.e. a mixture of grasses, heather and other plants). In most cases,the quality is extremely poor due to heavy rainfall. thin leached soils and low temperature. Most grasses and herbs which can tolerate these conditions are of very low nutritive value for cattle and sheep. The inaccessibility and rocky outcrops on much of this land prevent the application of lime and fertilizers and its capacity to carry livestock is likely to remain low.

There is a tendency to regard pasture as stable and persistant, something which has always been there and will remain so until eternity unless a farmer ploughs it up. This is really far from the truth. For whatever purpose a pasture is intended, certain factors must be considered.

1. The species of grass and clover present.
2. The level of soil fertility and use of fertilizer.
3. The frequency, intensity and method of defoliation, that is, how often the leaf is removed and whether by an animal or a machine, and how much leaf and stem is removed each time.
4. The use of herbicides to control weeds or even poor quality grasses.

VIZ. 1. - SPECIES

Far fewer species are sown down in a pasture today than even 10 or 20 years ago. Single species leys as against multi species leys now predominate or there may be multiple varieties, i.e. of ryegrass. One grass and white clover leys certainly exist and are being looked at anew at the moment due to concern of the future cost of nitrogen fertilizers. The argument for sowing multi species mixtures is that each species should have a different production cycle and therefore cover all shortcomings. However, with nitrogen application being so significant and silage being so important, a single species ley can now be control grown much easier.

Ryegrasses

The ryegrasses are the most important grasses used constituting well in excess of 80 per cent of the agricultural grass seed trade. Such is the range of varieties within the ryegrasses that leys of one to ten

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or more years may be prescribed. The highest standards of soil fertility are necessary for continued high production and, provided that they are well maintained, the duration of grazing swards derived from the more persistent varieties is indefinite, whence their origin. The high nutritional quality of the ryegrasses, their response to high levels of nitrogen use even in the drier situations, their speed of establishment from sowing and ability to compete with weed species, are attributes which have tended to relegate other grasses to a minor role for special management systems or soil and climate situations. Whilst a single variety of ryegrass can sustain high production as a ley and satisfy livestock needs, each has its defects, be it seasonal unpalatability, lateness of spring growth, frost susceptibility, low resistance to disease or lack of persistency. Appropriate combinations of varieties or species are generally more reliable and, in less intensive systems of stocking, give a more complete and seasonally productive diet for livestock.

Tetraploid ryegrasses

The tetraploid varieties of Italian and perennial rye-grasses are highly palatable to livestock at all times of the year. They have a higher content of soluble carbohydrates and a slightly higher moisture content up to heading stage. This feature, together with their larger and thicker walled cell structure, demands a longer wilting and drying time for silage and hay crops. The tetraploid varieties, though winter hardy, are generally less persistent than the corresponding diploid varieties. When used as sole constitutents of the mixture, they produce more open swards allowing ingress of other grasses. The Welsh Plant Breeding Station at Aberystwyth has been responsible for the wide scale introduction of these into Britain whilst varieties from other countries are also now available.

Cocksfoot

The use of cocksfoot is now largely relegated to areas of severe drought and to upland areas of lower overall stocking intensity and lower fertilizer use, where it can make a substantial contribution with ryegrass in the late spring and mid-summer at comparatively low cost.

Timothy

Timothy has long been used as a minor but significant constituent with ryegrass of hay leys and is especially suited to the heavier soils and those of high organic content in wetter areas. In grazed ryegrass

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pastures the timothy contribution is less significant in yield terms, but such swards are preferred by stock at moderate levels of grazing intensity. With today's increasingly high levels of nitrogen and stocking density, its contribution as a highly palatable species is reduced and it is being superseded by the tetraploid varieties of ryegrass which have improved palatability.

Meadow fescue

Currently the limited use of meadow fescue is further declining due to its slowness of establishment from sowing, its overall yield and the inability to compete with unsown species in the sward, resulting in lack of persistency.

Other grasses

Other species such as tall fescue are used for special purposes such as grass drying, and red fescue for extremes of hill land improvement or land reclamation.

Clovers

White clover includes the small leafed Kent Wild White and the larger leafed N.Z. type white clovers. Red Clover and lucerne are used for special purpose swards. White Clover accounts for about 54% by weight used in the country, Red 21%, Alsike 6%, Lucerne 5% and other herbage legumes of minor importance 14%.

The National Institute of Agricultural Botany (N.I.A.B.) Cambridge, has the responsibility for producing annually the recommended seed lists for all agricultural plants.

A variety can be added to a N.I.A.B. Recommended List only after it has been accepted for the U.K. National List, which is published by the Ministry of Agriculture, Fisheries and Food (M.A.F.F.). The Plant Varieties (National List) Regulations 1979, require that a variety shall be included in the National List before it may be sold for seed purposes in the U.K. and this acceptance is dependent upon the new variety being distinct, uniform and stable and, except for vegetable and amenity grass varieties, of satisfactory value for cultivation and use. The responsibility for adding varieties to the National List rests with the M.A.F.F., but the N.I.A.B. undertakes that part of the technical work which is done in England and Wales on which decisions are based. The N.I.A.B. publishes Classified

Lists for cereal, herbage, vegetable and potato crops, summarising the main characters of all varieties which can be marketed in the U.K.

Varieties on the Common Catalogue published by the E.E.C. Commission may, generally speaking, also be marketed in the country; this catalogue lists varieties which have been placed on the National Lists of one or more member states. It is possible therefore for varieties to be sold in the country which have not been included in a comprehensive U.K. trials system, and farmers are advised to pay careful attention to this fact when considering such varieties.

The Grasses Variety List base their variety description on the following characteristics;

YIELD

SIMULATED GRAZING MANAGEMENT (Yield & Seasonal Growth)

CONSERVATION MANAGEMENT (Yield & Seasonal Growth)

DIGESTIBILITY - (D Value)

CORRECTIVE YIELD TO A COMMON DIGESTIBILITY LEVEL FOR A FIRST CONSERVATION CUT

DATE OF CUTTING AT 67D CONSERVATION MANAGEMENT

PERSISTENCE

WINTER HARDINESS

DISEASE RESISTANCE

They are also classified into 4 current categories of use:

1. Varieties classified for general use;
2. Special use;
3. Provisional recommendation;
4. Becoming Outclassed.

Herbage legumes are not as extensively covered and information is mainly on yield, disease resistance, flowering dates and D Value.

Plant Variety Rights are accepted in agricultural circles and appear to be past a debating subject and reference is made of the Canadian book "The Seeds of the Earth" as being the main source of information for objection by people who are so inclined. Plant Breeding Companies do not like to talk openly about this commercially competitive area although it was mentioned that New Zealand was considering a better Southern

Hemisphere breeding site, mainly based on cost of production than Australia and that in the future P.V.R. in the two countries may have to have a similar relationship to that between the U.K. and the E.E.C.

2. FERTILIZER USEAGE

A pH of 5.5 to 6 is aimed in grassland production and lime or an industrial waste production substitute is often applied at least 12 months before initial pasture renovation. If required for quick renovations half dressings are spread before ploughing and half on the ploughed area before further tillage.

Nitrogen use is the dominating factor in all British agriculture performance. In 1980 the U.K. used 1.2 million tonnes of nitrogen fertilizer. In general terms this is applied as split dressings to total the following:

Winter Cereal	140 kg/Ha	
Spring Cereal	90 "	
Grass Leys	155 "	to 500 depending on the intensity of management
Permanent Grass	130	"

Nitrogen is generally applied as growth patterns dictate and units per acre, or hectare, is the terminology used by most farmers.

The use of nitrogen on leys may be up to 500 kg/Ha (400 units/acre) per annum. Small dressings of nitrogen, e.g. 50-75 kg/Ha (40-60 units/acre) may inhibit the growth of red clover in short-term hay or silage leys but white clover can tolerate up to 312 kg/Ha (240 units/acre) per annum where pastures are intensively grazed and soil moisture is adequate. At higher rates of nitrogen the clovers make little contribution to total production. Apart from their soil contribution, which can be of the order of 100-175 kg/Ha (80-150 units/acre), clovers add to the palatability of swards and raise the nutritional quality, especially in mid-season. Excessive clover content can cause serious bloat problems.

A concerted effort by a group of farmers concerned at the way so much of U.K. agriculture now relies on fertilizer and chemical companies when viable alternatives seem to be available have set out to regenerate interest in clover by forming a "Forage Legume Association". A strong "Grasslands Society" is active in the U.K. which receives strong support from chemical and fertilizer companies and it does seem grass receives

the most attention from the Association.

The need for phosphorous is considered less due to the soil build up and topping up is practised, often 40-50 kg/Ha. In the case of potassium many clay soils showed little response. Other soils are often given 30-40 kg/Ha annually. Farm manure is still spread extensively in those areas in which stock are still to be found. Slurry is increasingly available as more sophisticated animal housing systems are installed and Government regulations on affluent disposal are updated.

3. DEFOLIATION

The U.K. farmer has a very accurate means of calculating how many of his pastures are performing by his cutting of so much of it for silage. The housing or over-wintering of animals inside in so much of the country means he aims for maximum conservation in the spring - often this can be pushed to two cuts and sometimes a third as an autumn cut as well is taken. Hay is also used to a large degree, most of it still in the small bale but handled mainly by mechanical means.

A difference in regrowth of aftermaths has been noticed when a stubble of 3 to 5 cm. is compared with one of approx. 7 cm. Examination of the shorter stubble reveals that the majority of young tillers have been cut off whereas on the higher stubble they are left largely untouched. This means that the undamaged tillers can quickly regrow ready for the next grazing or cutting cycle and so minimise the regrowth period - this seems to ensure optimum persistence.

4. HERBICIDES AND CHEMICALS

One has to admire most U.K. farmers mastering of the bewildering array of chemicals available to him. This is particularly true of the arable farmer. It was quoted that a crop could be sprayed up to 14 times between planting and harvesting. Many sprays are "shandied" together and the actual number of times a field is sprayed could be as low as 4. It would appear that a more accurate summary is that many farmers rely on the advice of the commercial representatives. Many sprays, particularly fungicide, are of the prevention is better than cure type despite plant breeders work in breeding resistance. One business house slogan summed the situation up - "Choosing the right chemical is a complex business - choosing the right supplier is simple - choose the best - choose us!"

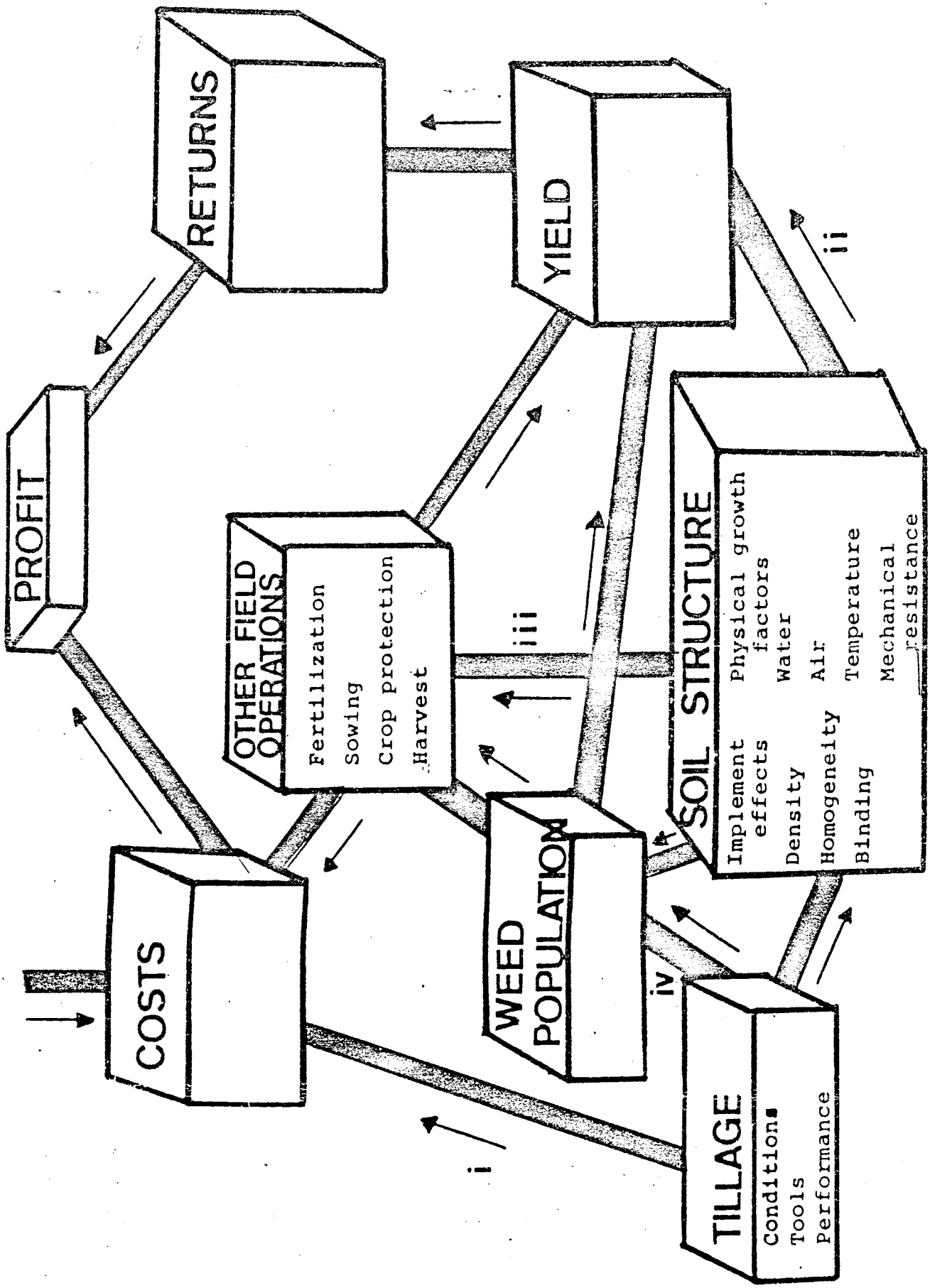
Specific growing systems incorporating fertilizer and spray programmes are advocated by the Agricultural Development and Advisory Service (A.D.A.S.), commercial companies and farm advisors and one is selected and usually followed by a farmer. Grassland farmers are not affected to the same degree but thistles and docks are rarely to be seen on good farms. The successful use of herbicides depends on some important aspects covering:

Type of pasture and its stage of growth;
Health and vigour of the pasture;
Dose rate as instruction advice;
Correct mechanical application;
Type of weeds;
Stage and rate of growth of weeds;
Weather;
Interaction with other pesticides.

Spray application is a changing and challenging science in the U.K. at the moment. Conventional application is by modern boom sprays. In arable crops the "tram lines" system is used whereby the pre-determined vehicle tracks are marked out at sowing by the shutting off of seed rows to leave guidelines for subsequent fertilizer and spraying operations. Automatic cut-off mechanisms are available on drills and 12 metre tram lines are the most popular. This in fact means about 5% of the land in a field is not sown. Low ground pressure vehicles are presently being developed in a number of forms for use in spraying as often application has to be during periods of wet soil conditions. The lead in low volume application is coming from equipment manufacturers and there has been some reluctance by chemical companies to reformulate sprays to suit these developments. Demand is growing and other advanced spraying equipment being used on a small scale commercially include controlled droplet application and electro static sprayers.

The National Institute of Agricultural Engineering and the Weeds Research Organization (W.R.O.) are working on these as are manufacturers. I.C.I. is close to releasing its electrodyne system with its very low volume rates down to 5 litres per hectare. Weed wiping bars are used on docks and thistles and apart from the low ground speed requirement (3 miles per hour) would be worthy of further investigation in Australian broadacre type pasture weed control. Granular herbicides must be an alternative - imagine a slow release pellet sown at the time of planting and protecting

DIAGRAM i


RETURNS
YIELD
PROFIT
OTHER FIELD OPERATIONS
Fertilization
Sowing
Crop protection
Harvest
SOIL STRUCTURE
Implement effects
Physical growth factors
Density
Water
Homogeneity
Air
Binding
Temperature
Mechanical resistance
COSTS
WEED POPULATION
TILLAGE
Condition
Tools
Performance
i
ii
iii
iv

a crop from weeds until harvest. Slug pellets are used extensively with sowings in the U.K. and the mechanisation is available but formulations are at trial stage only.

Chemical weed control is considered only of a transient benefit unless other deficiencies often associated with drainage, fertility, grazing and topping management are corrected. Most herbicides used are available in Australia.

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LAND RECLAMATION

Reclamation is still occuring on the moors and other high country particularly as some of these areas are now eligible for increased subsidy under certain E.E.C. grant aid schemes to isolated farmers. Some of these areas though have been prevented from further development by conservation pressures which seek a stop to the loss of heath lands. Many of these areas are served by Experimental Husbandry Farms or other institutions such as the Hill Farming Research Organisation in Scotland. Reclamation practices under these rugged conditions include slashing, spreading lime and then seed, near Abersywth in Wales, with an emphasis on white clover for nitrogen. At Redesdale E.H.F. in the north of England, direct drilled autumn turnips are sown for two years and then grass and white clover are direct drilled in the spring of the third year. Two years of sheep grazing improves the fertility and breaks down the heath and excellent reclamation has resulted.

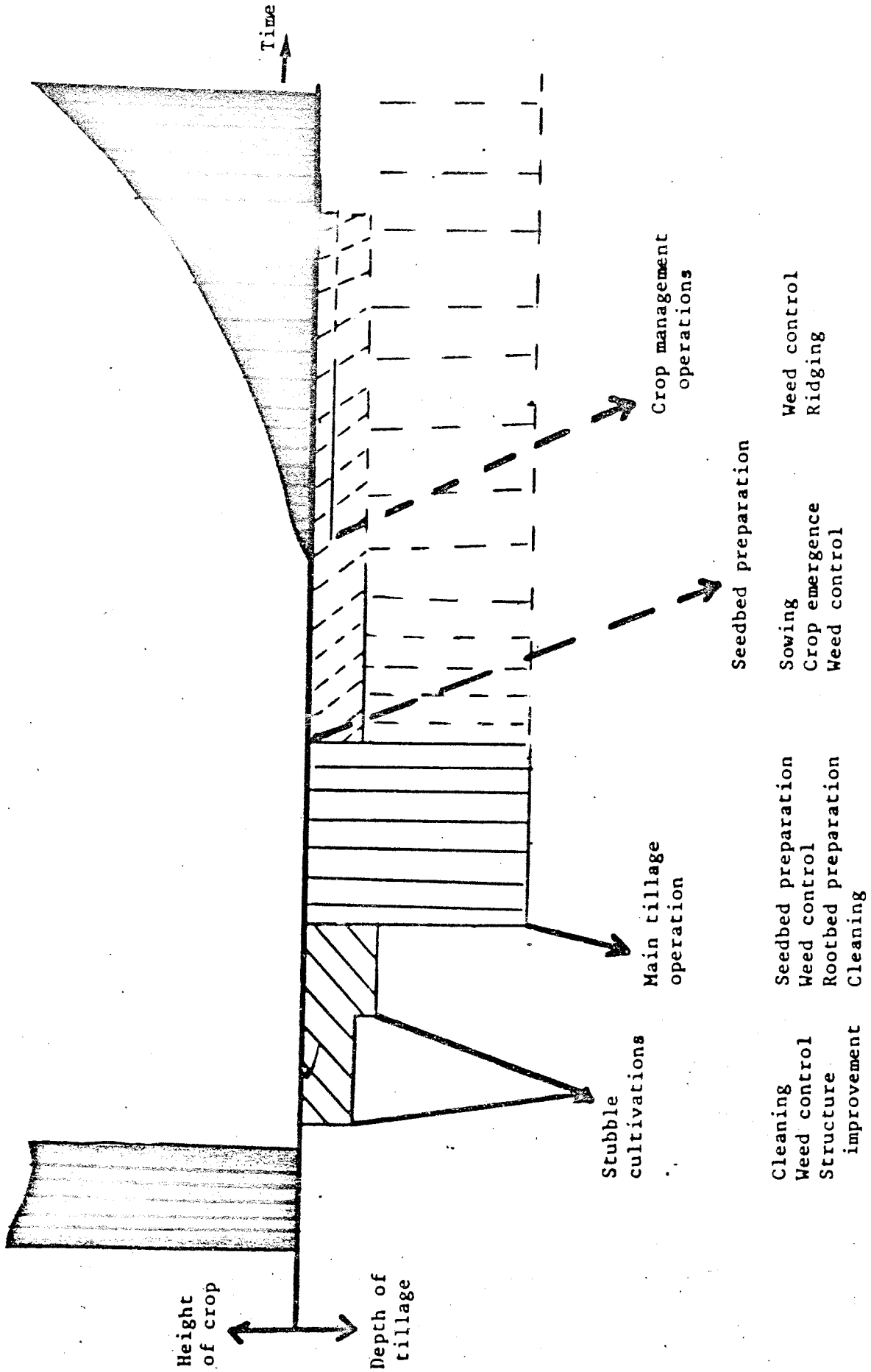
The maximum benefit from tillage is found where it directly affects yields, as with seed bed cultivation, but few operations have such direct effect.

(See diagram i Sheet 15A)

We should remember that more than a seed bed, a root bed is being prepared. Perhaps this is the most important characteristic as subsoil condition enters into it. "Cosmetic" field operations should be avoided as they are expensive.

(See diagram ii Sheet 16A)

DIAGRAM ii


Time
Height of crop
Depth of tillage
Stubble cultivations
Cleaning
Weed control
Structure improvement
Main tillage operation
Seedbed preparation
Weed control
Rootbed preparation
Cleaning
Seedbed preparation
Sowing
Crop emergence
Weed control
Crop management operations
Weed control
Ridging

Most conventional tillage implements are common to both traditional Australian and U.K. farms. A new approach to cultivation in the U.K. is gaining acceptance on some heavy soils following work done by N.I.A.E. and the development of anew generation of implements. The principles involved could well have use in many Australian arable soils as well as in pasture renovation to break down compaction in the root bed. The implements include the Howard Paraplow, already an award winner at the Orange National Machinery Field Days, Flat Lift Ploughs and Power Driven Shakaerators. The concept of paraplow illustrates the thinking behind these implements. All concerned with the development N.I.A.E., Howard and I.C.I. were enthusiastic as to its place in Australia. Their concept is worth relating.

The Paraplow has been designed specifically to assist the natural structure forming processes in the soil to create better conditions for crop germination and growth. The Paraplow achieves this by loosening the soil thoroughly and efficiently, breaking up areas of compaction to a depth of up to 14 inches.

Design Criteria

The basic idea was that to achieve economically a soil structure required by crops, an implement must compliment soil structure formation rather than destroy it. This implied six main criteria to us:

1. The implement should crack the soil along natural patterns, rather than disrupt or invert it, and should do so efficiently.

2. The implement should loosen the soil just as much as needed - not more and not less.

3. The implement should leave a level surface suitable for drilling so that subsequent cultivations, which recompact the soil due to traffic, are not necessary.

4. The amount of soil loosening by the implement should be adjustable to suit soil type and moisture conditions, rather than the farmer needing to wait till conditions suit the machine.

5. As a necessary economic and commercial factor, the implement must be operationally attractive in terms of costs, rate of work, reliability etc.

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6. In many countries, but not Britain, the implement must be able to work through trash.

Tests have shown that the slant-leg principle is a highly efficient means of breaking up compaction. This is because the leg is designed to move soil by lifting, rather than by forcing it sideways. The lifting action pulls the moved soil into tension, rather than compression, and fractures the soil mass by exploiting natural planes of weakness. A slant leg can operate with 30% less drawbar pull than a vertical tyne working at the same depth in the same soil. Another test result, achieved during development work carried by the N.I.A.E., found that the slant leg could be set to achieve a significantly greater zone of fracture down to the maximum working depth, than a vertical time.

Paraplow in Grassland

Because the Howard Paraplow is designed to minimise disturbance at the soil surface, it can be used in grassland.

Compaction in permanent grassland and long-term leys builds up through the ground pressure from vehicle movements and the weight of grazing animals. In many situations the Paraplow can be used to reduce the soil density in the compacted layer, without seriously disturbing the surface.

This can make a major improvement in the production of grass and the ability of the soil to absorb surplus moisture.

The 'Paraplow' in farming systems

When and where the 'Paraplow' should be used is of course as with any technique, a matter of farmer judgement for individual fields. The following broad guidelines may be helpful in making that judgement rationally.

1. If the soil structure is suitable for the next crop - only weed control by herbicides is required.

2. If the soil structure is suitable generally but headlands have been compacted - loosen the headlands only by 'Paraplow' before drilling.

3. If the soil has a good stable structure generally suited to reduced cultivation or direct drilling, but has been damaged by compaction or a plough pan - loosen the whole field with the "Paraplow' the first year and then only in subsequent years if it is damaged again.

4. On soil types inherently not suited to shallow cultivation or direct drilling due to poor or unstable structure, loosen each year with the 'Paraplow'.

5. If the need to re-seed pastures arises because of poor soil conditions and compaction, loosen with the 'Paraplow' before direct re-seeding.

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Flat lift ploughs use the advantage of wings on subsoilers to create a lifting fracture to the soil profile. The timing of this operation is critical, if the subsoil is too wet the results will be disappointing. The attachment of wings to the side of subsoiler feet increase the amount of subsoil loosening 3 - 4 times when compared with the conventional foot for a draught increase of only 20 - 30%. Further increases in disturbance with a better re-arrangement of the loosened clods can be achieved on undisturbed soils by placing shallow working tynes ahead of the subsoiler. The shallow leading tynes do not increase the draught and in some cases they may reduce it. Angles to insure loosened soil is not brought to the surface have been calibrated by N.I.A.E. The shakaerator is vibrated through the ground by the tractor P.T.O. The whole implement is moved up and down and from side to side at the rate of 9 - 10 vibrations a second. It can work without bringing large lumps to the surface of by mixing topsoil and subsoil. It works best when the soil is dry.

Also being used is the "progressive" approach in which the one implement makes shallow tyne cultivation which is followed by successively deeper cultivation until the compact layer is removed. The shallow tynes being in the front and are followed by the deeper tynes behind. Cloddy tilths are a problem associated with the initial use of this implement.

A "space age" component is being successfully used to reduce wear on soil engaging faces. An aluminium oxide ceramic is giving up to 5 times

longer wear on tyne points in the field despite their inherent brittleness and susceptibility to impact damage provided they have adequate support.

DRILLING

Ploughing (mouldboard), discing, harrowing and rolling for a fine, firm seed bed is considered as traditional in the U.K. as in Australia. Equipment variation is wide as continental equipment is also to be seen. Large horsepower 4 wheel drive tractors are used regularly to assist in beating the vagaries of the U.K. weather. Sowing depth of 12mm or a little deeper in dry conditions are the norm. Rolling is carried out after drilling. Some broadcasting of seed is carried out and the reciprocating type broadcast nozzle is very popular. In Scotland 80% of grass is in fact sown under cereal but it was not as evident as a method in England.

REDUCED CULTIVATION

Although used to some degree in arable cropping, pasture renovation using reduced cultivation does not appear very often. However fairly basic methods still survive such as discing a bare sward and broadcasting seed and following this up with a harrowing and rolling.

DIRECT DRILLING

Direct reseeding of new pasture following destruction or partial destruction of the old sward by herbicides is certainly the centre of increasing interest following direct drilling successes in the arable field. It has not, however, gained as much use as its advocates believed it would. Although the initial operation is relatively easy there appears to be problems in successful germination. The success rate must be elevated to levels that make reseeding in this fashion an economic alternative to doing nothing or reseeding by the more traditional methods. Depending on the contents of the existing sward Glyphosphate (Round Up) or Paraquat (Gramoxone) are the sprays used.

It should show advantages besides that of cost saving as against that of ploughing and reseeding. The system can be used where it is either impossible or undesirable to plough for a variety of reasons. Where it is done without overall spraying or in conjunction with band spraying, stock can graze the paddock within a few days. Very little time or production is lost because at least two-thirds of the sward is left undisturbed. Interestingly, some of the early direct drilled cereal cropping work in the U.K. was done with imported Australian

combines but now a number of U.K. units are available. Most of these can be used in pasture renovation and include double disc (Parmiter Moore), triple disc (Bettison) and tyned (I.H.) units.

However, a number of smaller width specialised pasture renovation seeders have been developed recently. They all try, in some method, to achieve closely what the Weeds Research Organization (W.R.O.) set out to do when it designed its "one pass" system. Likewise, the Scottish Institute of Agricultural Engineering (S.I.A.E.) had design parameters when designing its seeder for introduction of clover to hill pastures. They were;

(a) The provision of edaphic conditions for establishment of clover at low seed rates (less than 4.5 kg/Ha).

(b) Minimal interference with grazing programme and the retention of sufficient undisturbed sward to prevent poaching.

(c) The ability to sow at an even depth on very uneven surfaces.

(d) The avoidance of costly breakages when used on land with surface or near surface rocks.

(e) Minimal disturbance of the surface mat to prevent the development of weeds and to prevent erosion.

(f) A relatively simple machine, easy to operate with an acceptable working rate.

In order to meet these requirements, the machine should make a slot 50mm deep and 100mm wide to protect the seedlings from desiccation by wind, remove top growth and litter, and reduce the initial competition from the existing sward. A quantity of loose soil in the bottom of the slot was also desirable to provide suitable edaphic conditions for seed germination. The distance between slots was restricted to a range of 0.3 to 015m. Slots closer than 0.3m apart were considered to cause too much land disturbance, especially in peaty soils, and to make the machine difficult to operate in rocky conditions. On the other hand, slots more than 0.5m apart would result in the clover taking too long to spread outwards and meet between the slots.

The machine presently commercially available include:

Gibbs G.B. Slot Seeder - twin disc and skimmer culter style developed in conjunction with W.R.O. Available with band spray.

Howard Rota Seeder - An early development and still around. Standard rotavator with clipped blades upon which is mounted a seed box.

Hunters Rotary Strip Seeder - Independently mounted, chain driven rotary cultivation units with depth control developed by S.I.A.E.

Charter Surface Seeder - Protor type machine makes a very wide slot using 2 discs and tyne and eliminates spray equipment.

Aitkenhead Sod Seeder - N.Z. Machine with specially designed tyne points, available with band spray (available on the Australian market).

Such is the interest in these implements that they, along with the flexible arable units, such as Parmiter Moore and Bettinson are presently being trialled by the Welsh Plant Breeding Station on various sites around the country, e.g. Hereford.

Sod seeding trial: Establishment and growth down-the-row on September 25 at Hereford

	Aitkenhead	Bettinson	Gibbs	Howard	Moore	HUNTERS SIAE	Vredo	CHARTER Prototype
Row spacing mm	360	180	260	120	100	230	120	770
Unsprayed Score	3	7	9	7	4	10	2	9
Sprayed Score	4	7	9	7	4	8	2	7
Overall mean score	3·5	7	9	7	4	9	2	8

Score 10 – best establishment and growth within drill rows.
Further counts and assessments will be made to check growth, yield and botanical composition.

It is hoped these trials are also demonstrating how the job should be tackled. Limitations occur when the surface mat is too thick to be penetrated by the machine and if conditions are too moist, particularly on heavy soils and gleening takes place inside the walls of the slots. Trash problems are possible under some conditions. Application of fertilizer, particularly nitrogen, accompanies the drillings and surprisingly grazing under U.K. growth conditions can resume around 14 days later and be continuous for rye grass and with 3 week rest periods for clover on unsprayed or band sprayed fields.

Commercial guidelines include leaving some green growth for spraying and I was surprised at the length they did leave, even after what U.K. farmers called hard grazing.

Band spraying recommendations for 70mm strips were Glyphosphate at 4 litres per hectare or Paraquat, 5 litres per hectare.

SOWING RECOMMENDATIONS

Italian -	tetreploid rye grasses	16kg/Ha
Perennial ryegrass		12-15kg/Ha
White clover		2kg/Ha

Sowings were much heavier in other field trials I visited.

Autumn sowings predominate and slug pellets are used at sowing. Most slots are between 25mm and 76mm wide and from 160mm to 380mm apart. The machines are very expensive and would suit contractors. Only the dual arable-pasture drills are wider than 2.1 metres.

The Grasslands Research Institute (G.R.I.), Hurley, have also been monitoring information and comment that outside management guidelines a lot of reseeds fail to persist.
Although individual farms reported nearly double silage yields from reseeds, Hurley expects rises in dry matter of around 20% in the first year after slot seeding. The following table illustrates recovery of costs through extra livestock output or replacement of part of gross area by other crops using figures for a farm practising slot seeding.

Enterprise gross margin (John Nix 1980)		Years needed to recoup costs of slot seeding if annual dm yield percentage increases are:			
	£/ha	5	10	15	20
Dairy cows*	600	3	1½	1	¾
Dairy heifers*	200	9	4½	3	2¼
Suckler beef*	150	12	6	4	3
18-month beef*	250	7	3½	2½	1¾
Store fattening*	150	12	6	4	3
Fat lamb*	155	11½	5¾	3¾	3
Winter wheat	400	4½	2¼	1½	1
Spring barley	300	6	3	2	1½
Potatoes	800	2	1	¾	½
Sugar beet	600	3	1½	1	¾

* *Most frequent alternatives*

FLUID DRILLING

Vegetable and flower growers have shown it is possible to germinate seed in a prepared gel and then sow the seed. Monsato, utilising Round Up, along with the company Fluid Drilling, are presently achieving very high establishment figures with rye grass after earlier trials have shown that

fluid drilling can increase the rate of emergence and seedling numbers in the presence or absence of moisture stress. The seed is in fact imbibed for 12 hours and then drilled with a drill modified by fitting 2 x 3 row peristaltic pumps used to pump and meter the Laponite Gel. In these trials the fluid direct drilling of undressed ryegrass seed regularly resulted in well established stands of grass (50 plants/m row). The dry sowing of grass was not always successful.

The gel seeding of grass also offers an opportunity to provide an envelope of nutrients, pesticides and plant growth regulators around the seed.

The commercial adoption of this technique would allow the consistent establishment of high yielding swards independent of large variation in terrain and soil environment. The system will be used on a large scale from 1983 and certainly warrants investigation for potential in the drier Australian environment.

DRAINAGE

Increasingly, my interest turned to drainage as before renovation or in fact any cropping is attempted, the message is loud and clear - is soil drainage satisfactory?

With grant aid as high as 70% for drainage it is an undertaking which has caused a large industry to develop. $60 million is spent annually on drainage of 120,000 hectares in England and Wales. The Soil and Water Management Association (S.A.W.M.A.) is an association of farmers, researchers, contractors, manufacturers and dealers, consultants, advisors, land agents and colleges. Essentially, the role of the association is to co-ordinate, direct and exchange information that promotes good soil and water husbandry. Its journal and many field days provide ample scope to debate drainage systems, tile v. plastic drainage and ancillary drainage equipment. Investigation into more sophisticated drainage in high rainfall areas in Australia could benefit by close contact with this association as it could by close contact with the Agricultural Research Council, Letcombe Laboratory in Oxfordshire. Even after centuries of field drainage it is felt progress towards more rational design of field drainage systems is limited by lack of information on response of plants to high water tables at different stages of growth. Not only, therefore, have field experiments but lysimeter experiments also been set up at Letcombe. Lysimeters consist of profiles of earth 0.8 metres

in diameter and approximately two metres deep which are removed and placed in laboratory surroundings. Water tables can be controlled and rainfall patterns adjusted using a mobile cover and irrigation. Water movement, soil condition and plant growth are all monitored under the required conditions. These lysimeters were on display at Letcombe Silver Jubilee Subject Days "Roots at Work". Work in hand also includes research on soil structure, microbiology and fertility of the soil. Under U.K. conditions surplus straw that is not baled is usually burnt (although public pressure may restrict this in the near future) to avoid adverse effects on plant establishment and yields. Micro-organisms, including pathogens, which invade roots, produce toxins such as acetic acid or compete for available oxygen are, in part, responsible for these adverse effects. Letcombe work shows the potential for toxin formation is governed by the availability of cellulose substrates and declines with the onset of winter. Grass and weed residues which remain after using a herbicide can produce similar effects/ this damage seems to be linked to toxin formation and invasion by Fusasium SPP. Calcium peroxide used as a seed coating has properties which, in the laboratory, can overcome most of the adverse microbial effects.

THE PROBLEM OF GRASSLAND POACHING

Poaching refers to the penetration of the sward by the hooves of grazing animals, causing excessive damage to the herbage and deformation of the soil. As a problem it has become more widespread and severe in the wetter regions of England and Wales since the early 1950's; a result of higher stocking densities associates with the increasing use of fertilizer nitrogen. According to G.R.I., Hurley, losses due to poaching are common also in regions of Scotland, Ireland, New Zealand, Australia, The Netherlands, France and Japan.

In susceptible regions the risk of poaching imposes a major constraint on increased production from grass and on management flexibility, especially on dairy farms. There are two ways, in principle, by which this constraint may be relieved.

1. By making the ground stronger, for example by improving land drainage, the sowing of stronger grass varieties or the use of soil treatments (conditioners).

2. By the removal of stock from the pastures at times when these are most susceptible to poaching damage. This may require more farm buildings, the provision of hard standing in fields and the application of reliable guidelines for the grazing management of susceptible land.

The long term research objectives at the G.R.I. are therefore to ascertain whether the methods available to relieve the constraint are both feasible and economic, and indeed, to seek to develop new and more effective methods. In the Department of Soils and Plant Nutrition studies are in progress to determine the changes in soil physical conditions caused by poaching at farm sites. Preliminary results show that poaching involves reduction to infiltration rate and the incorporation of ponded rain-water into the surface layers of soil causing progressive soil dilation and loss of strength.

Experiments will be performed to investigate how the changes in these and other soil parameters affect grass growth, thereby obtaining an objective evaluation of longer term poaching damage. Under Australian conditions change due to heat and dryness would have a much greater influence.

Studies are also in progress on the nature of poaching susceptibility. A new instrument, the 'Grassland Poaching Penetrometer', has been built with which it is planned to measure and compare directly the poaching susceptibilities of different soils. The effectiveness of methods of reducing poaching susceptibility may then be evaluated.

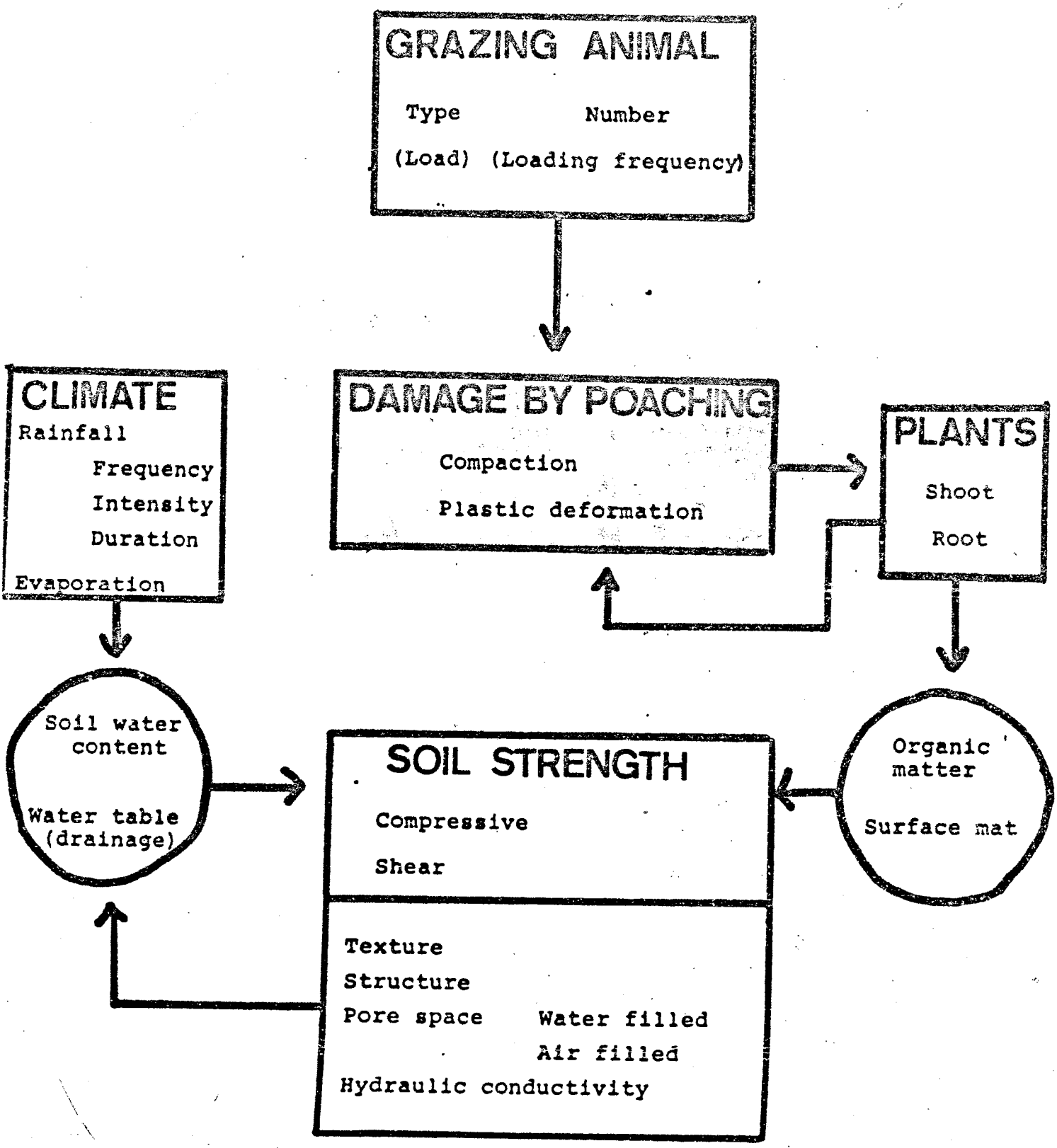
In joint studies with staff of the Permanent Grassland Division of the Institute at North Wyke, Devon, it is aimed to establish guidelines for the management of poaching susceptible land based upon soil measurements.

Although the removal of stock from susceptible areas would be an unlikely solution in Australia, there should be a better understanding of poaching damage in the overall soil compaction situation.
(See diagram 3 Sheet 26A)

TOWARDS THE YEAR 2000

Currently it is estimated that the support energy input into grass production in the U.K. is between two and three million tonnes of oil equivalent per annum. When their North Sea Oil has gone, when natural gases exhausted and the coal reserves have been used,

DIAGRAM iii


GRAZING ANIMAL
Type
Number
(Load)
(Loading frequency)
CLIMATE
Rainfall
Frequency
Intensity
Duration
Evaporation
DAMAGE BY POACHING
Compaction
Plastic deformation
PLANTS
Shoot
Root
Soil water content
Water table (drainage)
SOIL STRENGTH
Compressive
Shear
Texture
Structure
Pore space
Water filled
Air filled
Hydraulic conductivity
Organic matter
Surface mat

grassland will remain the nation's greatest natural resource. As things stand at present solar energy, used by the plant to power the photosynthesis process, will be the major energy input. In the meantime, it is being realised by an increasing number that a genuine attempt must be made towards low energy farming. Whether by using such changes farming will continue to achieve the food production requirements of that part of the world is not clear and may not be for decades. Meanwhile Australia has increasing reasons to see its agriculture is attuned to the changing scene, both in the short and long term.

I believe the following to be important in achieving this goal.

The economic justification for the present cost structure of U.K. agriculture is of a political nature. Australia's effort to see that it does not further disadvantage it in world trade should be by the highest of political representation.

Australians must recognize that because of E.E.C. action New Zealand will increasingly be a greater competitor in both traditional and recently developed markets.

Chemical and machinery innovations will continue to flow from Europe. Australia may see many of these but should be aware of being used as a dumping ground for obsolete equipment and chemicals.

Particularly in the chemical field care will have to be taken to see that change is not made just for changes sake but for sound, economic or environmental reasons. In the U.K.. in 1976 10% of the variable costs of winter wheat production went on chemicals - in 1982 the figure was nearer 45%.

Introduction of Plant Varieties Rights would not see as dramatic change to pasture species as to other cropping and horticultural varieties. Pasture plant breeding for our environment will continue to be a requirement of our own breeders.

Soil moisture and soil compaction studies should be given a high priority in high rainfall areas of Australia as scientists look into pasture decline.

A strong and professional public relations sector must be continued to be built up in the National Farmers' Federation of Australia to "lobby" political, press and public opinion for the good of the Australian rural population. The Public Relations side of the National Farmers' Union is a very active arm of the Union.

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BOTH WORKING FOR WOOL

- From Bill Poynton : Victorian Sheep Grower Nuffield Scholar who is being sponsored by Ballarat Centenary Sheep Show Committee and Qantas.

Within 10 miles of each other in the industrial hills of West Yorkshire, two highly skilled organizations are seperately working at improving wool growers returns, namely, the International Wool Secretariat and the British Wool Marketing Board.

The larger body carrying out this onerous task is the International Wool Secretariat's Technical Centre at Ilkley. Here on behalf of its sponsor countries, Australia (who currently contibures 64% of I.W.S. funds), New Zealand, South Africa and Uruguay, it carries out research into many varied aspects of wool manufacturing and also develops commercial application of techniques initiated by others for example, C.S.I.R.O. It works together with its London based I.W.S. headquarters, Wool House, on promotional information destined for design agencies, manufacturers and retailers. Every possible use of wool is exploited including sheep skin application in vehicles, wool filled quilts on beds and "Merino Extra-fine Wool" use in an international program embracing special support for super fine wools of 19.5 micronmetre and finer.

At both Wool House and Ilkley each year an increasing number of wool growing visitors are being shown by the mean and women they assist in funding, the activities of the I.W.S. No fewer than 15 technical developments either considered close to commercial application or actually recently licensed to industry can be seen in a short visit to Ilkley, and of course there is always work at the drawing board stage. All these, it is hoped, will keep wool in front of its synthetic competitors as they enter a new phase - the development and marketing of a new generation of synthetics, some of which are described as having "wool like" characteristics. They are more expensive to produce and will be marketed at the top end of the textile range in direct competition with wool.

It is possibly not widely realized that the I.W.S. is in its 45th year of operation and that it has as well as its London headquarters, some 31 strategically located offices around the world. Widely recognized though is the quality assurance provided by the Woolmark and Woolblendmark labels. Over 15,000 companies in 53 countries are licenced to use these symbols and labels which are sewn onto products at the rate of 400 million a year.

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Among other recent I.W.S. developments for which licences are issued, or expect to be issued and royalties received, include:

LINTRACK - permanent creasing which supersedes SIROSET. Interestingly at this stage licensed to Dry Cleaners in the U.K. and not manufacturers.

SIROSPUN - spinning technique. Enabling improved spinning on a modified conventional spinning frame.

ZIRPRO - Zirconium treatment giving flame and heat transferring resistance to wool used in protective clothing, curtains and upholstery fabrics.

TRANSFER PRINTING - involving chrome dye transfer from printed paper by steam and pressure onto fabric.

FELTED YARN - considered to be a break through in keeping costs down, particularly in carpet manufacture,

PAPER WOOL PACKS - manufacturing techniques are being worked out in the continuing quest for a better wool pack.

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Located in the City of Bradford, is the Oak Mills head office of the British Wool Marketing Board who act solely on behalf of the British Sheep producer. It is compulsory for owners of 5 sheep or more to register with the B.W.M.B. and subsequently sell their wool to the Board who grade (class) it and pay a set schedule price to the grower. The wool is then auctioned to the trade in commercial quantities at evenly scheduled sales througout the year. It must be remembered that the average consignment to the Board from its 82,000 suppliers is only approx. 470 kgs. and that with something like 40 breeds of sheep plus numberous crosses found in Britain makes any other wool selling system impractical. Britain is the ninth largest producer of sheep and wool in the world. With more than 3% of the world's sheep, it produces less than 2% of its wool. (Within the E.E.C. it has almost half the sheep and produces about 45% or the wool).

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The Board, in announcing its 1982 prices last month, aims to keep its average price to producers at the same rate as paid last season - 93.05 pence per kg. (approx. A$1.60), for fleece wool. Reason for the peg in prices is the Government decision to hold the wool guarantee at 115 pence per kg. - the same guarantee as last year - and the year before that! Sheep producers probably receive a 1ittle over 2 pounds (A$3.40 approx.), per fleece on average. This measures up against a lamb carcass price of around 40 pounds (A$68 approx.), in the peak of the season. (By contrast, New Zealand lamb can be seen hanging in butcher shops at around 20 pounds a carcass).

Perhaps the most interesting activity in the Board's basket is its market development and promotion policy. The latter is funded largely by a 1% grower return contribution. Its central point is its British Wool symbol and its use. The Board's Managing Director, Brian Dunn, describes it as building an image for British Wool by linking the internationally-high reputation of British sheep breeds with high quality merchandise made from their wool - and preferably made in Britain. It ahs been a successful story, more so than might ever have been hoped in recession torn times when the British textile industry has fallen to only half the size it was ten years ago.

Surprisingly, overseas sales of British wool for carpets, mattresses, hand knitting yarns, knitwear and garments have greatly increased. Sales of British wool and British wool knitwear to Japan have more than doubled over the past year. In Italy, U.S.A. and indeed Australia, leading manufacturers have been licenced to use the British Wool symbol and thus are buying increasing amounts of British wool.

The Board conducts a highly successful mail order business dealing in British woollen goods and has recently joined with the giant Marks & Spencer chain in a retailing agreement.

Many British Wool articles also carry the I.W.S. Woolmark symbol through their manufacturers being so licensed. However, this is not always so and its quite possible that in these cases the association of Wool and Woolmark could be assisting in a British Wool sale. Britain do not contribute as a sponsor to the I.W.S. Perhaps the Black Welsh Wool Patterned Sweater or the Herdwick/Swaledale Heavy Knit Sweater you intend buying at the end of winter sale had better be closely scrutinised - it might just be that its producer is getting a ride on the colonial sheep's back!

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SHOWING ITSELF OFF

- From Bill Poynton : Victorian Sheep Grower Nuffield Scholar who is being sponsored by Ballarat Centenary Sheep Show Committee & Qantas.

The Royal Agricultural Society of England is currently preparing for this year's Royal International Agricultural Show, which takes place at the National Agricultural Centre, Stoneleigh, from 5th - 8th July. As the result of staging the finale of the World Simmental Congress over the first two days, the show will have greater international appeal than ever before. In 1981, out of the attendance of 190,000, the total number of overseas visitors was just under 9,800 with 5,000 registrations at the International Pavilion. International registrations were headed by the French with 491 and Australia followed closely with 421.

Each year the Royal Show provides a platform for the many British research and advisory organizations to show their latest development projects directly to the world's agriculturalists. The "Science into Practice" exhibition will this year feature over 15 leading research establishments, covering a wide range of topics aimed at increasing efficiency and productivity.

Among them will be projects relating to electro-static spraying, new grass varieties and their management and the use of growth regulators in cereals.

With computers and electronics featuring more and more in agriculture, the electronics exhibition brings together a wide range of computer control and communications systems for farming - closed-circuit television, Teletext retrieval systems and Prestel - plus the many applications for desk top computers and automatic control systems.

In addition, farmers can see computer systems in practical operation on two of the permanent livestock units at the Royal Showgrounds, the Pig Unit and the Dairy Unit.

These two units, together with the beef, calf, poultry sheep and deer units, demonstrate the latest animal husbandry buildings and systems under commercial conditions, and are always a major attraction for farmers visiting the Show.

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The development of practical demonstrations such as these, plus the 1,250 trade exhibits, covering every aspect of the industry - machinery, agrochemicals, livestock, finance, forestry and services - has an international market-place for agriculturalists throughout the world.

Little wonder the Royal Agricultural Society of England, which was established in 1838 is so pleased with its 246 hectare National Agricultural Centre (known country wide as N.A.C.), site at Stoneleigh which as been the permanent site of the Royal Show since 1963.

Along with the permanent livestock units, many other agricultural organizations are now based at the site. A work force of around 300 each day file into the centre offices as diverse as the Agricultural Training Board's national training centre, National Federation of Young Farmers Clubs and the Grand National Archery Society. A modern 368 bed hostel - the Rank Village - provides low cost accomodation at the N.A.C. all the year round while at show time use is made of large student accomodation facilities at the nearby Warwick University which is in summer recess.