

*Nuffield
Scholarship
Farming Tour
Report
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Foreword

I am indebted to the Nuffield Foundation for the opportunity to travel and study farming, and I would like to express my sincere thanks to the staff at Nuffield Lodge for their guidance and assistance throughout my stay—the officers and members of the National Farmers Union for their hospitality—the Director and staff of the National Agricultural Advisory Service for all their help—the British Potato Marketing Board, both Board members and staff for their time and knowledge so freely given and to the staff members of the many research centres which I visited and all the families with whom I stayed, for their wonderful hospitality and kindness.

N. Q. WRIGHT,
Annat,
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1968 NUFFIELD FOUNDATION

DOMINION TRAVELLING SCHOLARSHIP FOR FARMERS

Report on six months study of farming in the United Kingdom, with particular reference to the management of intensive mixed farms, and the mechanized handling and containerization of agricultural produce.

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1. INTRODUCTION

The scholarship provided for a six months stay in Britain from the 14th April, 1968, to the 1st October. As outlined, my particular interests were the intensive management of mixed farms, the mechanization and containerization of farm products with particular emphasis on potatoes.

The journey to Britain also gave the opportunity to study marketing in Japan, and also see some of the agricultural industry in Russia during a brief stop over. While in Britain trips were made to study potato production in Holland, and farm machinery in Germany. An extension of my scholarship on the return home enabled me to study agricultural marketing and the handling and processing of vegetables in the state of New Jersey, United States; and also some valuable information was gained on a visit to the state of Oregon in north-western America.

2. IMPRESSIONS OF BRITISH AGRICULTURE

The outstanding features in British agriculture are:

1. High level of production from arable farms, with the tremendous growth in the cereal crops.
2. Modernization and mechanization of equipment to give a more efficient harvesting operation. Examples: Potatoes and cereals.
3. Rising productivity in the dairying industry.
4. Intensive systems for broilers, pigs, turkeys, etc.
5. The need for intensification for the beef and sheep industry.
6. The fact that hill country is changing in intensification.
7. Horticultural Industry. It is being modernized and intensified to compete with European competition, with the long-term view of Britain's entry into the Common Market.

Other main points in British agriculture are:

1. British agriculture has doubled its production since the war. It now has a total productive output of some £2,000 million which is more than Australia and New Zealand combined. New Zealand being £500 millions and Australia £1,300 millions, giving a total of £1,800 millions, only a third less than Canada's output.
2. The aim of successive governments has been a cheap food policy. This also has the effect of holding wages in industry.

3. LAND USAGE

In a land almost the same size of New Zealand, forty-nine of the sixty million acres are used for farming. They are: 11 million acres of crops, 7 million acres of leys, 12 million acres of perm-

anent pasture and 19 million acres of rough grazing. The proportion of this 19 million acres of poor country is much lower in England, but higher in Wales, Northern Ireland and in Scotland. It amounts to three-quarters of the total area. When one realises that approximately one million acres of crops are grown in New Zealand (that is, total cropping area) this is roughly equal to the area of potatoes in Britain. From this, a picture is obtained of the intensity in which arable farming is going on in Great Britain.

Rainfall varies from 20 to 26 inches in the east to 35 to 45 inches and up to 60 inches in the west. Conditions in the growing season are ideal with no real dry period as we know it.

The beauty of an English countryside is something one will never forget. With its green fields and neat hedge rows and crops and beautiful woodland areas interspersed throughout, it is something that makes a deep impression on any visitor to that country.

4. PRICE SUPPORT SCHEME

Before considering any managerial or farming aspects in British agriculture, one must have some idea of the importance and structure of the price support scheme in British agriculture. When we look at the total output of British agriculture, it is approximately two thousand million pounds sterling, and this is produced by four per cent of the population. Total estimated cost of agricultural support for 1968 is £286 million, and this is made up as follows:

Cereals	£47 million
Fat stock	£63 million
Wool	£75 million
Potatoes	£4 million

Relevant production grants, such as for fertilizers, ploughing, field drainage, calves, beef cows, hill cows, total £97 millions.

Hereunder are some individual items of subsidy:

- Fat cattle, £10 per hundredweight, live weight.
- Fat sheep and lambs, estimated dress carcase weight, 3s 6d per lb.
- Fat pigs per 20 lbs. dead weight, £2 7s 2d.
- Eggs 3s 6d per dozen.
- Wool 53½d per lb.
- Milk 3s 8d per gallon.
- Wheat per hundredweight, £1 7s 5d, equivalent to 14s 3½d per bushel.
- Barley, £1 5s 2d per hundredweight.
- Oats, £1 7s 10d per hundredweight.
- Potatoes, £14 17s 6d per ton.
- Sugarbeet, £6 16s 6d per ton.

After seeing those figures it is quite obvious that British agriculture could not exist in the intensity that it does without government support, particularly in some of the areas of Scotland and Northern Ireland some distance from high population density.

Britain's progress since the war and the passing of the Agriculture Act of 1947 has been made possible by the capital injected into agriculture by government support, and this policy could be justified on a national security basis alone.

Britain now produces sixty-six per cent of its own food requirements, compared with thirty per cent pre-war.

The more one looks at British agriculture the more one realises how much it is governed by political decisions. By altering the annual price review each year, and encouraging prices in certain areas, it can alter the pattern of production. Britain has only achieved this increase in agricultural production because she is an industrial nation and has put the necessary capital into agriculture. Indirectly this has kept wages in Great Britain at a lower level and the British housewife enjoys some of the cheapest food in Europe. This is an indirect subsidy from industry. This price support scheme for agriculture, could never be justified in New Zealand. We are mainly a farming nation and we cannot subsidise our agricultural industries to any great extent. Indeed it is our manufacturing industries that we must encourage to expand, particularly those allied to agriculture.

5. PRICE OF LAND AND LAND TENURE

Values of up to £300 an acre are becoming quite common, depending on locality and density of production, and with mortgage interest rates up to 9½%. This gives an overhead of some £27 an acre. On some land, of only slightly less value, it takes £20-£30 per acre to clear and drain, and this is being done in many parts of England. The biggest change in the countryside at present is that many hedgerows are being taken out for easier management and the farms streamlined with larger areas for cereal production. With the price of land as it is, the emphasis in the future would seem to be towards more and more intensive production.

Land Tenure:

Somewhat less than half the land in Great Britain is tenanted, but in Northern Ireland it is almost all owner occupied. Rentals are rising steadily and many farmers are now paying over £10 an acre, and some even more. With a good tenant and a good landlord this system works very well and indeed it gives the younger man a chance to get a start in farming. However, this was not always so, and I saw many things being done that we would consider to be bad farming practice. Company farming is on the

increase, due mainly to high land prices and the difficulty of the passing on of free-hold properties intact.

6. SIZE OF FARMS

There are over 200,000 full-time farmers in Great Britain, 120,000 on farms of less than 100 acres; and of these, 60,000 are said to earn less than the agricultural worker. However the remaining forty per cent of the farmers work approximately sixty per cent of the land, and the proportion of larger farms is increasing. I thought that one of the biggest problems in Great Britain in the farming industry is that there are too many small units. I realise this is a social as well as an economic problem and that amalgamation will take time and there is only one course to follow. The British government realises this and has a scheme to tackle this problem.

New Zealand must be careful not to let their farm units become too small because there is an inevitable trend in modern farming towards larger units. The development of trading groups amongst the farmers of Britain has been greater than in this country. Many farmers are emphatic that trading groups are effective in providing competition; that is, lower prices and better service from proprietary firms.

While some trade groups have been more successful than others, it is generally agreed that there is a limit to their size because, after a certain point, overheads become the same as the proprietary companies and the advantages are lost.

Co-operatives:

In some areas there is criticism of co-operatives by some farmers. They suggested that these co-operatives were becoming too big and too monopolistic and not providing a service. Whilst this criticism could be true in some instances, the emphasis of strong farmer-controlled organisations on agricultural trade is important. These can be a counter-balance to vertical integration and monopoly resulting from take overs. In New Zealand there could be a danger that monopolization could control the sale of our agricultural production. For example; our meat trade could be concentrated into the hands of four major units. A farmer in America said to me: 'The companies would not need to own farms. The monopoly would control the trade at the point of the market.'

Syndicates:

Development of syndicates for the operation of farms has proved to be successful in Great Britain through combined use of management skills, capital and machinery. There is scope for the formation of syndicates here, which could be of great value to New

Zealand farmers, particularly when using special purpose machinery. Although syndicates require a great deal of co-operation between farmers, they could be very worth-while, in that the syndicate could have credit resources greater than the individual members separately.

7. ADVISORY SERVICES

I was extremely impressed with the standard of advisory services available to the British farmer. There are thirteen experimental husbandry farms, eight horticulture stations, fourteen hundred Field Officers, including eight Regional Directors, and seventy Specialist Officers. Each county has a Senior Advisory Officer, together with a deputy, as well as a number of District Advisory Officers, on the basis of one to five to seven hundred farmers. Added to this you have specialists in various fields of farm management and aspects of farm management; for example, horticulture, farm machinery, stock etc. The cost of administration is just on £4,750,000. The accent is very much on management of the whole farm, and approaching farming as a business. They even collect and prepare data from individual farmers on standard forms, and these are analysed by electronic computer. The National Agricultural Advisory Service only works in England and Wales. Scotland has a separate advisory service based on the agricultural college. Large commercial firms also play a part in the advisory service with I.C.I. companies, such as helping with technical and managerial advice, and keeping cost of survey of farm accounts. The universities also play an important part in conducting costed surveys on various aspects of farm management. Private farm consultants are also widely used by many individual farmers.

8. RESEARCH

The amount and quality of research work being carried on in the United Kingdom amazed me. There are over twenty-five research establishments under the direct control of the Agricultural Research Council, and twenty-four research organisations in receipt of government grant through the Agricultural Research Council.

After that, they have the research establishments, horticulture stations and experimental husbandry farms that I mentioned earlier.

The work being done at all these establishments is of very high quality, and has done much to bring British agriculture up to its present high standard.

I came to the conclusion that:

1. British agricultural research is carried on in a far more intensive and on a larger scale than in New Zealand.

2. The agricultural scientists receive a higher financial return for their work than in New Zealand.
3. New Zealand, almost completely dependent on agricultural produce for its economy, should be spending more money on agricultural research. This is of paramount importance if we are to maintain our standards of living.
4. The work of the experimental husbandry farms in Britain in bridging the gap between the scientist and the farmer was outstanding. They provide the practical experiment for the farmers in each individual area.

9. FARM LABOUR

Over the last ten years there has been increasing competition for labour, and there has been a decrease of one-fifth in the labour force on the farms; but the efficiency of the labour is going up, and the increasing mechanization is helping to give a higher return per man engaged.

Most farm workers were earning over £12 per week and with bonuses and overtime, many were earning well over £1,000 per year. The drift to industries was mainly by the younger men; but I think many of them learn to specialize in mechanical trades, and when they do come back to the farms they are able to handle the modern equipment much better.

10. PESTS

Farmers throughout the United Kingdom have to contend with the problems of rabbits, moles, badgers, foxes, rooks and pigeons, and the damage caused by them in some cases, particularly moles, is very high; but the over all problem in British farming today seems to be the tremendous growth in the pigeon population. Whole crops of spinach, cabbages and cereal crops are sometimes wiped out and damage by pigeons causes great concern to many farmers. The carbide gun was heard all through the spring throughout many areas of Britain as a way of warning them off. Intelligent use of 1080 poison could have an effect on the reduction of the pigeon population. Animal pests have no place in farming. Extermination should be the aim, but the British farmer has the problem of where to draw the line. Does he kill his pheasants also. Many farmers rear pheasants on their farms and pheasant shooting, like fox hunting, is one of the pastimes of rural England.

11. MANAGEMENT OF INTENSIVE MIXED FARMS

Under this heading the whole scope of the scholarship could be reviewed and it was in this field that I found so much of value. Traditionally farming was a "way of life" and it will continue to

be a way of life, but certainly it will not be the same as in the past. With land prices up to £400 per acre in Britain, and with interest rates at 9 to 9½%, those who can afford to live on the land to commune with Nature are fast disappearing. Farm management could be defined as follows:

1. The deployment of the available capital and other basic resources for long-term profit within the limitations set by the farm; and the requirements, preferences and abilities of the farmer. The trend in British farming in the last few years is for a greater degree of specialization in management, so that today many farms are being devoted solely to cereal production, or to dairying, two of the most profitable enterprises in British farming today.

To quote some examples of intensive mixed farming:

1. Large unit of three thousand acres. Cereal production consists of five hundred acres of wheat, fifteen hundred of barley and two hundred and fifty acres of beans. The sheep population was fifteen hundred ewes and there was a sixty-cow dairy unit, which has been built up. Finally, there was potato production of one hundred and sixty acres.
2. 370 acre farm. 250 acres in barley, 60 in potatoes and 60 acres of sugarbeet. This farm is devoted wholly to cropping.
3. 1150 acres. 900 acres in grain, and 140 devoted to pig stud, small dairy herd, and beef cattle for a barley beef enterprise.
4. 900 acres. 800 acres in grain. 40 acres for ryegrass production and some consideration was being given on this unit to running a flying flock of five hundred ewes. To maintain the high returns per acre, tremendous emphasis is placed on the fertilizing programme and cultivation backed up by a spraying schedule which gives complete control of weeds.

Practical application on most farms was as follows: Twenty units of nitrogen—the sowing of the wheat which was sown at the rate of 180 pounds of seed per acre—followed by fifty units of nitrogen in the spring.

Crop rotation on one farm was as follows: Over nine years it was wheat, wheat, beans—wheat, wheat, oats—beans, wheat, wheat. The interesting thing being, that the beans were of the tick variety; the wheat crop, after the beans, was higher than the first one in the rotation. The part played by bean production in maintaining the high returns for cereals is a very important advantage.

Some of the gross margins on various crops taken from one of the farm records was as follows: Wheat £40 per acre, beans £35-40, Beef £35-40 and sheep £10-15.

Dairying returns would be up to £45 per acre. These figures explain the trends most suitable to British agriculture. The tremendous swing to cereal growing has brought its problems, and

the margins over the last five years have dropped five pounds an acre, which has made profitability of cereal growing under certain yields highly questionable. Some of these farmers are moving towards still greater diversification and specialization in the interests of better use of labour and greater returns per acre. Berry fruits such as strawberries, and crops such as flowers are recent innovations. An example of this is a four hundred and seventy acre property which I visited in Scotland. The programme of the farm was mainly cereal growing and potato production. There were also eight acres of strawberries and three acres of daffodils. With a low yield this year only ten tons of strawberries had been produced, and these are selling at 2s 2d per pound. The daffodils grossed some £200 an acre in the sale of flowers, and every three years the bulbs were sold at £100 per ton. This property also grew 120 acres of potatoes, 45 acres of sugarbeet, and vegetables such as leeks and carrots. This gave the farmer in his management of labour and greater utilization a more steady return all the year around. Instead of having the main part of his work in cereal production coming at certain times of the year, he was able to maintain a larger labour force to handle his peak periods but the diversifying into strawberries and other such crops enabled him to have a greater return on his whole enterprise, while still using the same amount of labour.

Another farmer, to quote an example, in Kent on a 700 acre unit, which was largely devoted to cereal growing, was also diversifying in the next five years into strawberries and berry fruits with the same idea in view—of greater diversification from his main lines of production to give better utilization of his labour throughout the year, and a higher return per acre. I spent a most interesting day with a farmer and his accountant looking at the farm accounts.

Here are some gross margin figures, followed by the average figures for the I.C.I. group and then the top ten of the I.C.I. group. Wheat—The farmer, £30 per acre. Average I.C.I., £33 per acre.

The top ten average of I.C.I., £42 per acre.

Barley—Farmer £33 per acre. The average I.C.I. £30 per acre.

The top ten average £42 per acre. Tick beans from the farmer, a gross return of £38 and herbage seeds, £18. This gave a cropping average of £31 an acre. The stock, which was stud Hereford bulls and heifers, averaged £67 and £53 respectively.

All livestock was grazed on 294 acres, giving an average return of £26 an acre. The average return per acre on the I.C.I. report sheets were: Sheep £21 10s, cows £20, fat cattle £11.

The total production off this farm was: Arable production, £26,290; livestock, £13,000. The area of the farm was 1,016 acres, 984 being effective. Suffolk sheep production per ewe sales was: 1963, £39; 1964, £39; 1965, £38; 1966, £26; 1967, £27.

The labour force working hours were itemised into various sections. Arable totalled 6,000 hours work. General—4,600, and livestock just under 10,000 hours. An average payment per hour was 6s 3d. The outstanding thing about these figures is the tremendous number of hours spent on livestock for low return, as against arable.

Continuous Corn: One question I always ask myself. How long could it be if they continue cropping at this rate? I saw one field that had been growing barley continuously for twelve years, and the return per acre was remaining constant. A research worker told me that the continuous growing of corn could continue. After six months I had the feeling that it could, and most experimental evidence bore this out.

Fertilizer applied on the cereal crops was usually sixty units of nitrogen, plus phosphate and potash as required—after a lay break rising to one hundred units to the second and subsequent crops.

Nitrogen:

If one has to name the outstanding thing in British agriculture I think it could be summed up in one word, nitrogen. To me the use and the effect of it was outstanding. It was the dominating factor in achieving high production. We are fortunate in New Zealand in being able to rely on clover as a fertility builder, but I think that the value of nitrogen out of the bag should never be forgotten. Greater use of nitrogen than is at present customary could often be justified in an intensive farming system. If nitrogen could be produced or bought at more economic prices than at present, New Zealand, with its longer growing period, would use a tremendous amount of nitrogen in pushing up production even further.

Break Crops: Farmers are always looking for new break crops to put into their arable rotation as a break from cereals. Potatoes, sugarbeet, beans, peas or rapeseed, short term leys for herbage seeds and even vegetables are used. Outstanding ones to me with particular use to New Zealand with the increasing use of cereals are:

1. Beans of the tick variety. The crops I saw were giving a return of some £38 per acre which was even above barley, and the resulting cereal crops grown after this helped to maintain a very high cereal average.
2. Short term leys or herbage seeds. Here we can see in the future an increase by this method of ryegrass for seed, in Great Britain. With the floor drying facilities that are now available many farmers are swinging to this, as a break to their cereal crops, and selling at a very profitable price. This

must have an effect on our sales of small seeds to Great Britain.

Chemical Ploughing: Minimum cultivation techniques aimed at reducing costs, particularly with the use of Paraquat, were being tried. To quote two examples: (1) Stubble paddock which was sprayed with two pints of Paraquat, and wheat drilled straight on top of it with no preliminary cultivation. The cost was £3 4s an acre inclusive of labour. The potential yield was sixty bushels to the acre. (2) Paddock was given conventional treatment of normal ploughing and surface cultivation. The cost of this was £8 4s an acre inclusive of labour, giving a difference of £5 an acre. This was a most interesting experiment.

Weeds: Couch grass, wild oats, and nettles prove to be most troublesome weeds in Great Britain, and it is imperative that we take even greater measures to eradicate them in this country, particularly the wild oat, which is becoming quite a problem on many arable farms in this country. Most farms sprayed at a routine spraying programme.

Future Trends in Farm Management:

1. Programming. As computerising statistics on farming to give you a greater detail analysis of your own management.
2. The Business Structure of Farming. There are changes in the future with trends towards more company work and a greater business-like approach on the managerial side of the whole enterprise.
3. Farming Co-operatives. How they are working in various fields:
 - (a) Combining with machinery.
 - (b) Combining to produce individual crops on a co-operative basis, mainly in potatoes and vegetables.
4. Price Support Scheme. The whole implication to British farm management and how it is effecting the overall thinking on farm management with the industry. It could be gradually phased out in a new type of support scheme put in the form of tariffs.
5. Cereal Production and the trend of British farming in which there is a swing to dairy farming for high returns with a high capital outlay in plant and buildings. Cereals, in which there has been a tremendous swing in cereal growing, and how the gross margins in the last five years have dropped £5 an acre, and made profitability of cereal growing under certain yields highly questionable.
6. Taxation. Problems of taxation in the new business-like approach which has to be put into managing the increasing

taxation problems, with capitalization tax and selective employment tax the new ones.

7. The completely new business-like approach of buying groups and production groups, where farmers join together to pool their resources or buying power and buy as a group on various individual commodities. Many of these are working extremely well in several areas where farmers, usually seven or eight, join together and work under the scheme in which they buy individual items, for example, one man responsible for the group buying of seeds, another one for spraying, and so the whole lot works out that they do their buying in bulk and greatly reduce their costs in this manner.
8. The growth of farm management discussion groups, where farmers discuss their managerial problems together.
9. The availability of intensive farm managerial short term courses for farmers, which is available in Great Britain. These are trends in British farm management, and ultimately can be applied to New Zealand farming.

12. PASTURE PRODUCTION

With twelve million acres of permanent pasture and seven million acres of leys, grass is the biggest crop in Great Britain. Pasture mixtures contain mainly perennial ryegrass mixtures with Timothy, and fescue pastures are quite common. Italian ryegrass is widely used as a short term ley, and undersowing is a general practice. The new tetraploid ryegrasses were also gaining considerable popularity. Fertilizers used on the sheep farms varied with some farmers using up to two hundred units of nitrogen. Of dairy farmers, many were using regularly up to four hundred units of nitrogen an acre and getting tremendous dry matter per acre production during the year. With the low light intensity and shorter season, clover does not have the same value as in New Zealand but in some areas it is still sown and occupies a useful place.

Hay: A limited amount of hay was made due to a wet season, and much of the hay I felt was too long in the straw to dry out adequately. Several techniques were used—the barn-dried hay being one that was used a great deal, utilising some of their grain floor drying techniques to dry the hay out.

Silage: To me the most practical way for conserving the grass for winter feed under British conditions. It can be made well and made consistently. Self feeding of silage made in covered barns or outdoors using tombstone barriers, or an electric fence at the silage face were common practice—indeed the cheapest way of feeding out.

13. CEREAL PRODUCTION

Wheat: The accent on arable farming in Britain creates a cereal acreage many times greater than in New Zealand. It was

difficult to find farms where the wheat acreage was comparable with our own on similar size farms. This acreage scale production makes for better utilization of farm grain equipment. An example would be a thousand acres farm with up to eight hundred acres in cereals. In other words, many farmers were growing up to nine-tenths of their farm in wheat or barley. The main varieties of winter wheat used were Capell, Champagne, Maris Widgeon and Maris Ranger, being of a high baking score, with a new variety, Joss Cambia, being a very high producer but not the same baking qualities. One of the chief differences between the two countries is that only approximately one-third of the British wheat crop is used for milling, the balance being imported, whereas the majority of the New Zealand crop is used for milling. With the high proportion of imported wheats in the United Kingdom I expected to find the bread a superior quality. This did not prove the case to my own palate. There is nothing superior in the breads in Britain, but there is certainly a greater variety available in the United Kingdom, U.S.A. and France, but nutritionally quality is more important than variety. Because of the importance of cereals, extensive grain handling and storage are a feature of many farms. Having regard for the volume of wheat produced on New Zealand farms, there were three methods of storage which could be applicable in this country.

1. Floor drying and storage of grain on flat shed floors. This system is being used extensively in Britain. In this system air ducts are placed at regular intervals over concrete floors in the building which was suitable for filling with grain up to a height of six to eight feet. The ducts are coupled to a fan and the shed filled with grain. This method gives drying and storage at a low capital cost in a shed which can be used for other purposes when empty, and a fan which can be used for barn-drying hay.
2. The development of chilling grain for storage instead of drying. This is done with a refrigeration plant and fan. By this method grain of quite high moisture can be stored safely for feed. For milling use the grain would still have to be dried. The cost of a chilling plant is comparable with the drying plant, but large volumes of grain can be brought to safety much quicker than by drying. This system is applicable for feeding grains rather than milling grains, though chilling does offer protection to grain from parasite attack.
3. The spraying of propionic acid on to grain to preserve it. This method can be used for storage of feed grains at any moisture content. The cost of storage is equal to 30s a ton and the equipment used to put it on the grain is approximately some £200. By this method feed grains are able to be stored at any moisture content, and enable a more palatable food for direct feeding. This can also be used on hay.

The development of testing new varieties of wheat are carried out extensively by both state and commercial organisations. Indeed it would be confusing to the farmer to choose a variety with such wide selections available. The competition between plant breeding firms to develop new and better varieties is very keen, and many acres are devoted to this. The competition for markets for new varieties does have one serious disadvantage, i.e., the high pressure salesman can promote a wheat before its merits are truly evaluated. The breeding of wheats for particular purposes is a highly specialized task.

Conclusions:

The further development of wheats for particular environments and purposes in New Zealand would be hastened considerably, if our plant breeders had more facilities than are at present available, because of the limited acres and resources of the Crop Research Division at Lincoln.

2. More thought should be given to the use of high yielding wheats for feed purposes in New Zealand. All our wheat research seems to be at present geared to producing high baking score wheat when we have a tremendous field opening up for the use of feed grains.

Barley: Barley production in Great Britain totals 96% of the total supplies, roughly seven and a half million tons. Most of this goes to the stock feed industry, in which there is a tremendous use of concentrates in Great Britain farming, and the rest goes into the brewing industry.

Oats: Britain produces 98% of its supplies which is 1.3 million tons. All this is used in the stock feed concentrate industry.

14. SHEEP PRODUCTION

There are twenty-eight million sheep in the United Kingdom which includes eleven million breeding ewes. There are thirty-seven breeds of sheep. The half-breed, which is a first-class ewe, is mainly derived from the Border Leicester, Scottish Blackface, Swandale or Welsh Mountain ewes. They are sometimes crossed for the second time with a Suffolk. The Suffolk is by far the most widely used fat lamb sire. Dorset Downs, Hampshire Downs, Dorset Horns, and very occasionally Southdown, all have a place, as have several others.

A 40lb lamb is being produced wherever possible. Ewe hoggets are bred from. There is a growing appreciation of good handling facilities, and these are being increasingly provided. Weighing machines of a simple, inexpensive kind are used to weigh and were standard equipment on many sheep farms. The standard of husbandry I felt varied considerably, but I did see

many of the best New Zealand practices being employed, and in isolated cases, some splendid examples of intensive sheep production on the mixed farms.

The swing to cereal production over the last few years has brought changes in the pattern of livestock production, of necessity relatively slow and gradual; but I did see signs of practices that could become more widespread and permanent. Even though the 40lb lamb is worth £5 to £7, I did not see many people making a profit from sheep. In the arable areas, unless there were some areas of permanent pasture the farms did not necessitate sheep being kept.

The high cost of wintering ewes was generally forcing the trend toward further intensification. All round stocking rates were not high, but summer stocking rates due to the long growing periods in each day, often were very high indeed, and I saw farms with rates of up to ten ewes to the acre, with one hundred and fifty lambs on them, in which they reared them to over 40lbs. Many lambs were fattened on the creek grazing system, with the ewes following on. They were fed concentrates at this stage, and this helped them to get their lambs away at 40lbs weight at sixteen weeks.

The main problems in British sheep production are as follows:

1. The high cost of maintaining a ewe throughout the year. The use of concentrates in feeding.
2. The meat trade itself is hopelessly antiquated with a grading system which does not compare very favourably with the compactness of the New Zealand system.
3. With over thirty-seven breeds of sheep there is no standardization as we know it in New Zealand, in which we have Romney predominant and Corriedale predominant in ewe flocks. This leads to unevenness in the production of the fat lamb, and does not give the standardization which is the keynote of New Zealand's production.

Conclusions:

The outstanding thing in the sheep industry in Britain is its high prolificacy, and this is where New Zealand could learn something from the British sheep industry. With our national average of under 100 per cent we must look to these figures in the British sheep industry to give us an increase in our national prolificacy. We must go on more to a system of progeny testing and recording that can provide the necessary data to assure progress along lines which could increase production and market requirements as demanded. Visional appraisal is not sufficiently reliable to reproduce the required end results.

The 200 per cent lambing performance of the Colbred sheep is a direct result of progeny testing, recording, and genetic selection along the lines as suggested. This system is only starting to be used in New Zealand, and I think it is a step in the right direction.

Individual breeders have made progress with the aid of recording and breeding from known genetic characters, but this must be done on a wider level. We have in the Romney ewe a diversified sheep which is able to forage and breed successfully over most of New Zealand. It is up to us to look at some of these breeds such as the Colbred, Oldenberg, and the Cadzow breeds to see if any of these can be brought into our national flock for comparison and trial. The successful transplanting of fertile ewe eggs into the ovary of a rabbit and transporting into this country opens up the vast possibilities for this comparison and trial work to be done in New Zealand, as well as taking less time due to the quarantine regulations. This will enable the scientists and the farmers, I think, to get the desired comparisons and, if necessary, the improvements in our present national ewe flock, because it is imperative that we have the comparisons in this country to see where we are heading in relation to the rest of the world in sheep breeding.

15. BEEF PRODUCTION

Cereal feeding is used to some extent with all beef production in Britain. The barley beef system based on taking Friesian calves from 200lb live weight to 900lb live weight at ten to twelve months of age on a diet of barley 85 per cent, 50 per cent protein and mineral supplement. The food conversion rate at this age is good—5lb of food to 1lb of live weight gain, compared with 12 to 1 for the more matured two and a half year old beef. Up to twelve months of age is the period of maximum growth rate for the Friesian, and under intensive systems they are out-performing other breeds. There are some barley beef houses that have gone out due, mainly, to the high initial price of the calves. When calves are being bought from £7 to £10 sterling there is a profit margin in it. When calves are fetching over £20 the complete profit margin is gone; and many intensive beef houses have gone out of production in the last two years.

The Charolais with its high weight gain is being tried in Great Britain but other breeds also have good live weight gain records, e.g. South Devon, Sussex, and the Lincoln breeds. These are all big-framed, well-fleshed animals. The popularity of these is mainly because of sheer economics, and the grading system in Great Britain, where the animal, as long as it grades—the one with the fastest growth rate, and the largest frame, is winning out in the commercial beef production unit.

The Aberdeen Angus in Great Britain still is the outstanding quality beef animal, but compared with the larger framed animals

it is not performing as well in the commercial field of cross-bred cattle due to its small frame.

The year-round production of milk in Britain gives a continuity of calf supply which does not occur in New Zealand with the practice of spring calving for seasonal production. The problems associated with barley beef appear to be mainly in the calf stage. The high mortality of calves is one of the aspects of this system which can be improved by specialist calf rearing. The intensive beef system could be modified for New Zealand conditions by using Friesian or Jersey cross calves which have been bred from a beef bull with a high weight gain record, and the aim would be to finish the beasts round about a thousand pounds live weight at fifteen months. Some degree of shelter would have to be provided and a ration of concentrates and barley be fed over the winter.

There is a place in New Zealand for the dual sucking system, in which with small beef herds they have cows suckling two calves—one of which is fostered on. This alters the whole economics of beef raising and could have a place in the smaller herds in New Zealand.

16. THE DAIRY INDUSTRY

The dairy herd has been severely hit by the foot and mouth epidemic which began in October 1967, and over 150,000 animals have been slaughtered. Even though this was a tremendous loss to the dairy industry, milk production still continues to be on the increase and between June 1964 and June 1967 the dairy herd increased by seventy thousand cows or 2½ per cent. Favourable weather has boosted milk yields and total sales off the farms are expected to be eighty-three million gallons higher in 1968 than in 1967.

This could lead to an over-supply of whole milk by some 20 per cent at the end of 1968-1969 season.

Dairying is at present, in British farming, one of the most prosperous enterprises, though it has a high degree of labour and organisation; but there is a tremendous influx of capital into dairy farming in Britain, and one saw schemes going in which three to four hundred cows were being milked at a high capital outlay of roughly £140 per cow. On being asked what was the interest on capital on the whole enterprise, they estimated it at 15 per cent. They then stated that this was worked out on a three hundred cow enterprise, but they could quite easily go to four hundred cows eventually with no additional capital costs. All this points to a tremendous production in milk and by-products in Great Britain, and one cannot help feeling the position we are in here as a dairying country, and the competition which we will eventually be

up against in the future years. Therefore these are a summary of the observations made in the British Dairying Industry:

1. Tremendous increase in dairying.
2. High capital outlay.
3. Profitable returns for capital outlay.
4. The effect of brucellosis in the dairying industry in Great Britain and the effort New Zealand should make to stamp out the disease.
5. The rapid increase in dairy production in Great Britain and the Common Market countries, and the ultimate effect it must have on New Zealand dairy sales to Britain and the European trade area.
6. The use of the Friesian and its effect as a dual-purpose animal, producing milk and calves fattened for beef at twelve months old.

17. THE WOOL INDUSTRY

The annual production of wool in the United Kingdom is seventy-eight million pounds weight, the guaranteed price being 53½d. Guaranteed prices are arrived at for all grades, relating to the previous year's realisation in a manner similar to our floor system. The wool is taken over by the British Marketing Board and sold by public auction. The grower is paid for his wool on receipt, and the wool is phased evenly on the market throughout the year.

Wool is graded at grading centres into nine hundred specified grades in a similar manner to that carried out in New Zealand. The wool sold under the British Wool Marketing scheme realises one of the highest average prices in the world for its type and the cost of marketing is equal to or lower than that of performing similar functions in other countries.

Most growers appeared well satisfied with the work of the British Wool Board. This system, from the growers' point of view, had limited seasonal fluctuations between sales, and also assured that he received immediate payment for his wool. From New Zealand's point of view I think the greater strength in this system appears to be that the wool is put evenly on the market, while the auction system was maintained.

International Wool Secretariat:

I visited the London headquarters of the International Wool Secretariat, where I was shown all aspects of the I.W.S.'s work throughout the world. One was left with an increasing impression of the great value of the part the I.W.S. is playing in the wool trade, and the great benefits that are coming from the work it is doing.

A visit was paid to the new I.W.S. Research Organisation Centre, Ilkley, Yorkshire. This has just been completed, and will do much to co-ordinate the research work into woollen fibres that is going on throughout the world. It will work closely in conjunction with the centres in New Zealand, Australia and South Africa. One saw the new processes that are being evolved, which are (a) crimping wool, a process for increasing the crimp in low count wool which will have a big effect on New Zealand cross-bred fleeces; (b) a new dyeing treatment, or piece dyeing of wool fibres, and many other new techniques which are being worked on.

To sum up one's impressions of the I.W.S.:

1. It is an organisation to promote growth in the sale of wool fibres throughout the world.
2. The work it is doing in organising the wool growers throughout the world to compete as a unified organisation in the battle against synthetics.
3. Collective organising of technical and scientific approaches to evolving new techniques for the use in wool fibres.
4. New Zealand wool growers producing fibre for a world market need an organisation such as I.W.S. to promote this article to the fullest advantage.

18. FARM MECHANIZATION

One could not help but be impressed by the tremendous intensity of farm mechanization in Great Britain. With some units of over a thousand acres, growing eight hundred acres in cereals and run by three men, one can see the increasing dependence on big, high-cost machinery. The trend, not only in Britain, but throughout most farming countries that I visited, was for bigger machinery and more powerful tractors to reduce the overall cost per acre.

Machinery Syndicates:

One saw several examples of these working in Great Britain, in which farmers pooled their mechanical resources for harvesting of individual crops, and this enabled them to use bigger machines for specific operations; and also led to a greater degree of specialization within the group; an example being one man handling all the potato cultivation and harvesting of three farms; and another man handling the sugarbeet operations over the three farms. This is one of the ways in which farmers are combining together for better use, and greater mechanization of their farming operations.

19. BULK HANDLING AND CONTAINERIZATION OF FARM PRODUCE

Bulk handling and containerization of farm produce is increasing in all agricultural countries that I visited, and some had carried it to a very advanced degree.

The reasons for moving into bulk handling are as follows:

1. The non-availability of seasonal labour on farms.
2. The cost of production by hand methods due to the increasing cost of labour.
3. The overall increase in production by the individual farmer through streamlining his whole operations by bulk.

Grain:

Most grain in Britain is handled in bulk. Problems encountered as compared with New Zealand conditions are as follows:

Higher moisture content and the difficulty in bringing grain to a safe level of moisture content due to the lower evaporation rate in British climates. This has necessitated the building of drying plants on most individual farms and, if not on individual farms, then the forming of syndicates to build grain drying systems where they can be used on a co-operative basis between farmers. In the main these worked extremely efficiently, and I felt that the whole of the grain growing operation in Britain was extremely well organised and efficiently run due to the farmers organising and storing their own grain on their own farms or on a syndicate basis as a co-operative.

20. POTATOES

Potato Handling in Bulk:

With potato production in Great Britain being seven hundred and fifty thousand acres grown annually, the movement to mechanized harvesting of potatoes is increasing.

There are many different factors influencing growers on particular farms in deciding whether they should go completely into mechanized handling. There were, however, no clear-cut guide lines.

Some seed growers were handling their crops mechanically, but some were using palletted boxes. Also, where table potatoes were handled mechanically they were stored in bulk, and then graded over the winter, although there were a number of cases where there was a big population nearby and then the potatoes were packed directly into 56lb bags in the fields and sent straight to the market.

Systems Used:

1. Potatoes picked by hand into baskets and loaded into trailers and carted to sheds where they are graded out over the winter by the farm staff. Only seasonal labour is employed for the picking operation.

2. Potatoes picked by hand into pallets and fifteen hundred weight or half ton pallets transported to the shed and graded over the winter by farm staff.
3. Potatoes dug by harvesters mainly of the single row type, conveyed into bulk pallets of fifteen hundred weight, and then handled in the sheds in the conventional manner over the winter.
4. Potatoes being dug by mechanical harvesters, handled completely in bulk, and stored in bulk, again being graded during the winter at either the farm or transported again to the packing houses.
5. Much work has been done in Great Britain on the studying of methods of potato storage in bulk. The work particularly at Sutton Bridge experimental station could be of great benefit to New Zealand farmers.
6. The potato crisp industry is one that is growing at a tremendous rate at present in Great Britain, and much work on the storing of potatoes in bulk for crisp production is being done. To summarise the present situation in Britain as it affects New Zealand in bulk handling and containerization of farm produce:
 1. What is forcing British farmers into bulk handling and containerization will ultimately force the New Zealand farmer to do the same.
 2. The work being done in storage, experimental and handling potatoes in bulk in Great Britain. There is little or none of this done at all in New Zealand and therefore it is of the utmost importance that some form of experimental and trial work be done in this field in the future.
 3. The use of large cool stores in New Zealand of not only our frozen meat products but also of our processed vegetables in containerized form, and potatoes in the bulk form could be held in these stores before or after processing. Therefore more containerized cool store facilities are needed in the agricultural processing areas of New Zealand.

The Potato Industry:

This was studied in some detail in Great Britain and visits were paid to Holland and United States looking at all aspects of potato production.

In Great Britain with just over 750,000 acres grown, as compared with some 23,000 acres grown in New Zealand, one can imagine the size and the scope of the potato production in that country. With most of the population situated in Southern England, that is where the majority of table potatoes are grown in Britain. As the seed potatoes are grown mainly in Ireland and

Scotland, the same set of trading applies as in New Zealand, with Auckland being the centre compared with the situation in Britain.

Over the last three years of production in Britain, there has been an over supply of potatoes and this has brought about difficult trading conditions for growers. There are over sixteen main varieties and only a few of these, mainly King Edward, are grown in both New Zealand and Great Britain. The average national yield of just on ten tons per acre compares very closely with New Zealand's average yield.

Potato Marketing Board:

The Board came into being in 1934, following some years of surplus production with potatoes virtually unsaleable at almost any price. Its main purpose is basically an attempt to provide greater security and stability for potato producers through the acceptance of certain forms of self-discipline, which are aimed at regulating supply more carefully with demand, in contrast to previous experience with periodic gluts and shortages arising from unregulated production and marketing.

Its Constitution: The board consists of thirty-three members. Four of these are appointed by the government for a three-year term of office, and the remainder are elected by registered potato producers from England, Wales and Scotland.

Registration of Potato Growers and Licensing of Merchants:

All producers of one acre or more for sale must be registered with the Board, and are required generally to make their sales through merchants licensed by the Board. This licensing of merchants is a protection afforded to growers by the Board, as licences are issued only to applicants of suitable financial standing and trading experience. The number of producers registered with the Board up to January 1968 was about 53,000, and there are about 3,500 licensed merchants in the country. There are also 3,000 registered producers who are licensed as grower-salesmen, who make direct sales to wholesalers, retailers, fish fryers and caterers.

Stabilization of Potato Acreage:

The Board regulates the potato acreage planted so that supplies should be sufficient to meet the nation's needs. At the same time these regulations help ensure that the potato growers obtain a reasonable return for the risk taken in producing this costly and variable crop. The acreage planted in potatoes is regulated by allotting a basic acreage to each registered producer, and by prescribing annually, if necessary, the proportion of his basic acreage which producers may grow without becoming liable to pay excess acreage contribution.

This penalty is not prohibitive. A producer may plant as many potatoes as he wishes provided he pays a previously agreed acreage contribution to the Board on acreage planted above his quota. On the other hand he is not compelled to take up all his quota if he does not wish to do so. For example: In May 1966 the national basic acreage of potential plantage with a hundred per cent quota amount was 722,000 acres. The actual acreage planted by registered producers amounted to 585,000. The Board took steps to bring the basic acreage more into line with planting without, at the same time, restricting producers who regularly planted their quotas.

Regulating Sales:

The Potato Board regulates sales of potatoes by subscribing riddle sizes and standards of dressing for table potatoes, and by requiring sales, in the main, to be made only to licensed merchants.

A table standard committee is appointed by the Board to advise about the standard to be aimed at, and it is realised that in the long run, potato producers only prosper if well-graded potatoes and good quality are supplied to consumers.

A team of inspectors has been built up for the purpose of examining and checking consignments on farms during the course of distribution, and on the premises of retailers, fish fryers, and prepackers. This means that virtually all sub-standard potatoes are discovered during the course of dressing on the farms, and are redressed before delivery, and in many cases, by agreement between the producer and the merchant. Many consignments are of a higher standard than prescribed by the Board.

Implementing the Government Guarantee:

The Board implements the Government guarantee for table potatoes by buying up those surplus by sale for animal feeding or other non-human consumption purposes. The 1965 crop, for example, produced a very large surplus and the Board purchased about 780,000 tons of this. However, 165,000 tons were eventually resold to the trade in May and June 1966 for human consumption. Large quantities were sold to farmers for raw stock food, and the Potato Board steaming plants worked to full capacity on farms producing a potato silage. The cost of operations such as these are met in part by the government under terms of the guaranteed price, and part by the Board from contributions of registered producers.

Research and Publicity:

The Board does, by means of experimental operations, try to improve the packing, storage and grading of potatoes, and the production of various forms of processed potato products. It may, under the scheme, undertake, encourage, collect and

distribute the statistical information which appears on potato production and marketing in Great Britain.

It makes grants for investigations into the effects of fertilization and irrigation, into the susceptibility to damage of different varieties, into cooking qualities with special reference to blackening, and into skin rot, sprout growth damage caused by slugs, effects of storage conditions, and disease resistance. Experiments have also been carried out in grading and packing new potatoes, and an experimental packing station has been established at Suttonbridge, Lincolnshire.

Much research is going on into the potato harvesting techniques, and demonstrations have been organised over the years. Damage is one of the most important problems facing potato producers in Great Britain, and indeed in all countries that I visited.

Finance:

The Potato Board obtains its funds mainly from registered growers at the rate of £3 per acre in respect of each acre planted to potatoes, and an additional contribution, £25 per acre being the maximum, is normally required in respect of acres planted in excess of the grower's quota for the year. The Board also receives from the Government, the guaranteed payments from the price scheme, and also gets a grant towards administration expenses.

Conclusions:

1. The tremendous size and scope of the Potato Board's work in Great Britain.
2. The research work carried out by the Potato Board, as compared with the work done by the New Zealand Potato Board.
3. The work done at Suttonbridge experimental station, and the storage of bulk potatoes could be of great interest to New Zealand growers.
4. The Potato Board's steaming plants, which were used to produce potato silage, could be of use in New Zealand in over-supply years.
5. The New Zealand Potato Board's functions and aims, as compared with the British Marketing Board, are exactly the same; and the Board could well study much of the work that is going on in Great Britain, undertaken by the Potato Marketing Board.

Seed Production:

The main seed growing areas in Great Britain are situated in Scotland and Ireland with Scotland producing 70,000 acres grown

annually for seed from which they produce over 300,000 tons of seed which are exported to other parts of Great Britain.

Visits were paid to the Pentland fields where much of the work of the potato breeding and certification work for Scotland is carried out. Visits were also paid to several commercial seed growers in Scotland and three nuclear growers of virus-tested seed which is produced as follows:

First Year:

The products of a single plant selected from the previous year's for type, and tested for viruses, are planted out in isolated plots to be tested again, stem by stem as plants develop.

Second Year:

The plots from this year are derived from the produce of the previous year which is grown again in a series, and may obtain up to a hundred plants, every one of which is tested.

Third Year:

Series of plots derived from year two have now reached the stage of certification. The plots are tested at the rate of 600 plants per acre, are officially inspected and certified officially as clinically free from virus infections and impurities.

Fourth Year:

The product of year three plots are bulked for certification and constitute the stock for year four. Testing is at the rate of three hundred plants per acre. It is at this stage that the nucleus seed grower makes his stock available for use by the commercial grower.

Fifth Year:

Fifth year is grown commercially. Testing is at the rate of one hundred plants per acre and the crop is tested for the last time as virus tested seed. This is then sold to other seed producers on a commercial basis and then marketed throughout Great Britain.

Conclusion—Seed Production:

1. The certification system in Scotland varies little from the New Zealand system.
2. New Zealand could give consideration to training inspectors, if the need arises, on the same standards as Scotland.
3. The work being done at Pentland Fields and East Crag potato stations could be of benefit to the potato industry in New Zealand, and it is important that scientists have a chance to see the work being done at these stations, and indeed throughout Britain, at regular intervals.

Cultivation:

This varies over much of Great Britain but most potatoes were planted in 30in rows. In cultivation, over half the growers use pre-emergence sprays, the main objects being:

1. To conserve the moisture in the soil.
2. To maintain a clod-free soil.
3. Growing in a clod-free seed bed so that mechanical harvesters could be used more efficiently.

Potato Production in Holland:

Total annual production of potatoes is as follows: 1.3 million tons, of which 250,000 of seed were exported, and 300,000 table exported. Seed and table are exported to over fifty countries throughout the world. I saw potatoes being packed, during my stay, which were being sent to Pakistan, Hong Kong and many places in the East Indies. This is a market that I think New Zealand producers could consider seriously and try to export to, because if the Dutch can do it from where they are, surely we, in our industry, should be able to consider the same thing from our own area.

Potato Co-operatives:

It is often said that Holland is the home of co-operatives, and indeed the potato industry was no exception. There were over 600 farmers in one co-operative visited, and growing over a total of 5000 acres of potatoes. This was one of the most modern stores one could imagine. The potatoes were being handled in bulk in vast quantities on giant conveyors to the various bins, and over 5,000 tons were stored at one time in this capacity. The whole operation proved to me that potatoes can be handled in large quantities without excessive damage.

In the set-up of the store they were in 200-ton bins, and the air was circulated through every bin. The potatoes were dried out from the soil within twenty-four hours of entering the bin. They were brought to the bins by an amazing arrangement of conveyor belts and then elevated out to be graded by the same system. The capital involved was over £300,000. Advantages received to growers:

1. They received a better price through the co-operative, higher standard of packing, and more uniformity of marketing. There was a handling charge of one to one and a half cents. The average price obtained was six and a half cents per kilogramme. The total storage was 7,000 tons and the temperature was separately controlled in each bin to give a fluctuation of only four degrees.

2. Sprout suppressors were used only on potatoes that were being kept over six months. The potatoes were bought from the farmers on sample of each lorry load. They came in bulk and sold on sample. The main grader for grading the potatoes has a capacity of a hundred tons a day net output with twelve men needed to work it. The machine is fully automatic in sizing and feeding.
3. The seed from the co-operative is sold on a guaranteed price and the handling price is a commission \$1 per ton. Potatoes that are too big to be handled on the table and seed markets are sent to the chipping factory for french fries.
4. On all the potato breeding that is carried out in Holland there is a breeding surcharge of 1½ cents per 100 kilogrammes of potatoes produced.

Potato Harvesting:

Trial No. 1: One man farmer handling potatoes in bulk with a two-row machine. One man was operating the harvester, one man on each trailer and another man organising the separating of dirt and trash in the shed, and packing the potatoes into 50-ton bins that he had organised in the sheds. The potatoes were stacked ten feet in height, and the shed was lined with one-inch wood-gratings on the floor, and an air duct two feet wide in the middle of the floor so that air could circulate with a fan for twenty-four hours to dry out the potatoes of the soil.

Trial No. 2: I saw a farmer digging with a two-row digger, elevating into bulk trailers—in other words four men for the whole operation as on the previous farm. The cost for the equipment he was using was as follows:

Potato harvester	\$3,000
Two bulk trailers	\$1,000
Elevator and seal cleaner screeners	\$1,000

This gives a total outlay of some \$5,000 on potato equipment. The labour required for digging and storage being four men. The capacity per day for digging—the best day being ten acres where excellent conditions prevailed. The soil they were digging was very good, with no stones and friage.

Cultivation of Potatoes:

Most growers follow a similar pattern in planting to New Zealand growers with an automatic planter for the smaller potatoes up to 4oz-5oz and a semi-automatic on larger potatoes on thirty-inch rows. The only difference was the use of an oscillating harrow for moulding up the potatoes. This operation is done four times, an inch going up on the mould each time so that you have the mould brought up gradually. This is due to the high water table on much of the Dutch farm lands.

Chitting of Seed:

This was done in most cases in Holland and growers are of the opinion that these gave a better yield for most seed crops; but in table crops, with a longer growing period, there was little difference.

Potato Washing and Packing Plants:

No. 1: It had an output of 400 tons a week, in which potatoes were graded up into:

1. The small, roughly up to 1-2oz variety sizes and used for canning.
2. 3-7oz used for packing in 5lb polythene bags automatically by two machines, and sent straight to markets in Germany.
3. The larger potatoes were graded and used for french-fries.

The potatoes were bought by sample, coming straight in off the farms storage sheds by trailers.

The plant had no storage at all, either for holding before grading or after grading. Everything in the store was stored on the farm, and then brought into the plant on a set day during the year. The potato grader was working to capacity of twelve tons an hour, and the washing and drying plant over ten tons an hour. This was a most efficient packing plant, was well organised, and everything was moving straight away from the factory itself. This plant was running for most of the year and had an outlet for all types of potatoes, including the damaged and misshapen ones which were sent for cattle feed.

No. 2: Packing house No. 2, which had a storage of up to 7,000 tons. The co-operative handled 15,000 tons throughout the year. The rest was stored on farms.

In the main storage shed the potatoes were all stored in one bulk heap. The seed was in a separate store in 50-ton sections and all were ventilated.

All potatoes were handled in bulk, but one-ton pallets were used where the grower was over ten miles from the plant.

Damage:

A little was evident on the potatoes but due to the small lapse of time between packing and marketing this was no problem.

Potato Planting:

The potatoes were planted for table production at four potatoes to the metre; and for seed, six potatoes to the metre, which works out that for table there are twenty branches on top of the ground per metre, and for seed, 25-30 branches per metre above the ground. This is how Dutch growers feel they get a better seed crop.

Summary:

1. One was very impressed with the overall efficiency and organization of the potato industry in Holland.
2. Holland is the home of the co-operatives and they are well organised and play a large part in the industry, giving the farmers a powerful marketing organization, with the most modern and low-cost handling methods.
3. The majority of potatoes are handled well mechanically and require a very small labour force—four men doing the sole operation, one digging, two on trailers and one in the sheds.
4. The industry is backed up by a large team of scientists and officers studying all aspects and problems of the industry.
5. The marketing organisation at home exporting to Common Market countries and also forty countries throughout the world.
6. The standard of packing and presentation is extremely well organised and efficient.

Problems in the Dutch Potato Industry:

1. An over supply in all countries in the E.E.C. area.
2. The high capital involved in the potato industry.
3. The cost of transport and freight to countries throughout the world.

Potato Production and Marketing in the United States of America:

A very interesting week was spent in the State of New Jersey looking at marketing and processing of potatoes, from which the following impressions were gained:

1. The tremendous competition in the processing markets in the United States.
2. The high degree of specialising that is going on.
3. The high standard of mechanization and harvesting of the potato crop.

Farm No. 1 Visited:

Over 350 acres were grown and every operation was done mechanically from digging, all handled in bulk, right through to planting again, where everything is handled in bulk to the automatic planters. The reasons for going completely to this form of operation were:

1. The unavailability of seasonal labour, forcing the farmer to look to mechanized methods. The high standard and capacity of the two bulk harvesters used.
2. The nearness of the population and the large number of the outlets for processing potatoes in the near vicinity, lent itself to mechanised handling.

Visits were paid to several packing houses, the best of which attributed success to the following:

1. A sound market built on the quality of its product turned out.
2. On fair marketing.
3. The good work conditions provided, which ultimately attracted good labour.
4. They packed in 5-10-20lb packs from the Mid-western districts of Idaho which gave them an all-year-round working time of eleven months, and which enabled them to keep the plant going at a high capacity for most of the year.

The main variety of potatoes grown in the area were Chippewa and Khatadin. These were being harvested in near-drought conditions and clods were proving a problem on most harvesting machines. In fact, irrigation was being done before digging in many places.

Visits were paid to markets and auctions. In one of them the farmers drove in with their trucks and the produce was sold directly from the truck by auction. This had an added advantage of saving a lot of double handling, and was an efficient set-up. Many of the potatoes sold were packed in polythene bags and sold in the supermarkets.

This brings its problems which are as follows:

1. These must be packed in small bags for ease of handling.
2. They must not be stored under bright lights for more than two days or greening will appear.

Undoubtedly with the American system, this is the way in which potatoes and all vegetables appear to be sold. In fact the figures are something like 90 per cent of all vegetables sold through the supermarkets.

Some impressions of looking at potatoes in countries throughout the world:

1. New Zealand growers will handle the potatoes with a greater degree of mechanization.
2. Greater processing of potatoes will be carried on in:
 - (a) French-fries.
 - (b) Canning.
3. The greater need for more intensive research into the storage of potatoes, and for the continued exploration of markets, particularly in South-east Asia for sale on a profitable basis.
4. **Canning Potatoes:** There is a definite need to produce or find a variety of potatoes to be the most suitable for canning production. In this field I feel New Zealand has a definite opportunity to explore and increase its markets, particularly within her own country and Australian and Pacific countries.

21. MEAT MARKETING

The Marketing of New Zealand Lamb

New Zealand supplies over 80 per cent of all mutton and lamb imported into the United Kingdom and 23 per cent of total meat supplies. New Zealand meat is well liked and sells on a long established market.

Outstanding impressions were:

1. Grading Standard. This has assured a consistent standard quality of meat and with most butchers that I met the comment was that New Zealand lamb is one thing they could rely on without seeing it.
2. The weight grades are geared to the housewife who only has a limited amount to spend on meat each week.
3. The down cross lamb is still the basis of the New Zealand meat trade, giving ideal carcass conformation at 30lb to 31lb weight. This appears to be the smaller lamb weight range and definitely the one that the English customer wants.
4. Fat is not wanted.
5. The even flow of lambs on to the market is of prime importance, particularly from December to May when the bulk of our lamb should be placed on the British market.

The establishment of the Omega grade of lamb has done much to improve the overall standard as, in fact, taking the leggy lamb out of the main line. This has been an action that has been well warranted, because the only complaints that I received from butchers were of the legginess that had crept into the New Zealand lamb over the last three or four years. The establishment of this grade has rectified the whole position and will do much to keep up the standard and conformation of our main line.

6. The twenty-one to twenty-two million lambs that are being sold in Britain each year did not appear to me to be saturation point.

All buyers that I met still wanted more New Zealand lamb and this number can be increased even further than the present twenty-two million at a gradual rate.

7. The change in marketing that has taken place with the shifting from the conventional butchers' shops to the tremendous amount that is sold through the supermarkets, and the greater emphasis on meat cuts in the future.
8. New Zealand processors must give greater consideration to cutting more of their total lamb production in this country, and sending it in pre-packed state to the suppliers.

9. **Beef:** Generally beef is an easier commodity to sell on world markets than lamb, and in Britain the demand for New Zealand beef was still very high. There is a definite market for the beef cuts packed in 60lb cartons shipped to that country for the Great Britain market. Consumption of poultry meat still continues to increase in Great Britain, and it is obvious that it will continue to rise and will be our biggest competition on the British market.

Turkey Industry:

For example, in 1964 the total production was 3.9 million birds, and in 1968 5.9 million birds—an increase of two millions.

It was stressed to me that within the next four years this will be expanded to over ten millions. The market at this stage is over supplied, but with an increase in marketing surveys in advertising, the product could be increased even further.

Production costs were at the rate of 3s 1d a pound with New Zealand lamb selling at an average of 3s 6d.

Marketing and Distribution:

There are four main avenues in development, which could be as follows:

1. Greater technological development of food processing, and greater pre-packing of meat products, and the accelerated freeze drying of vegetables.
This is coupled with the increasing importance of national brands.
2. These are linked with the housewives' increased demand for products which can be prepared and served quickly with the minimum of trouble.
3. The major changes of methods of growing for food retailing in recent years have been rapid in the increased number of supermarkets and self service stores.
For example: Woolworths, and Marks and Spencers were formerly not concerned at all, or only to a limited extent, with the retail sale of food.
4. Production has become more closely geared to the needs of the market. Contract production, with requirements of the processors specified to the producer both in terms of quality and quantity and even management, has become an integral part of poultry meat and vegetable production.

There has also been a trend towards this in beef and sheep meats, and I saw a particular example of this in the Danish agriculture through the establishment of contractual arrangements between producers, or organizations acting on their behalf, and processors, and in a few cases between producers and retailers.

Future Developments in Marketing and Distribution of Food in the 1970's:

1. The consumer will demand a higher standard of food processing and manufacturing. The food available to the consumer will be in rather a different form. The housewife will wish to purchase food in a form which reduces the skill and time involved in preparing and cooking and serving to a family.
2. The demand for consistency in quality so that an identical standard can be purchased.
3. There will be a trend to increased purchase of convenient foods.
4. During the 1970's the number of self-service retail food outlets will continue to grow while concentration within food retailing will cause the total number of outlets to decline. A greater proportion of supplies will be marketed through supermarkets in a highly processed form in pre-packed and branded lines associated with a standardized and predictable product.
5. The contract farming of the future may well include farmer retail agreements, as well as farmer wholesaler and processor arrangements, where the farmer is producing a product at a given time to a quality standard.

NEW ZEALAND MEAT MARKETING

The overall efficiency and evenness of quality in grading was recorded by most butchers to be of a very high standard, and New Zealand lamb continues to be a very popular commodity with the British housewife.

The following observations were made:

1. That our grading system is of a very high standard and is one of our main selling bases on the British market.
2. That the D's and 2's continue to be the main base of New Zealand trade, and suit most butchers admirably.
3. The effect of the omega grade is now tending to raise the standard of the main line of New Zealand meat coming into Britain, and is definitely proving a success.
4. The increasing amount of meat being sold through supermarkets makes one realise the increasing trend towards pre-cutting meat in Great Britain for the supermarkets.
5. New Zealand meat operators will have to give serious thought in the future to cutting more of their own meat immediately at the works, and packed ready for marketing. This would have its obvious freight saving in our shipping.

6. **Packaging:** Visits were paid to a large meat cutting works where over 3½ thousand lamb carcasses were processed in a day. The whole operation takes 6 minutes for one lamb. It was cut, packaged and priced ready for the supermarkets.

This operation is most efficiently organized on a chain system, which New Zealand operators could do well to copy for further packaging, and they have to consider:

- (a) Whether the clients want lambs pre-cut, or would rather do it when they get to the market.
- (b) Can they afford to pay the extra for it, including wrapping.
- (c) The availability of adequate storage space and personnel for the job.

1. JAPAN:

This is undoubtedly a market with unlimited potential. It will require different market presentation from European markets, because of the following reasons:

1. Japan has a rising standard of living and a desire to emulate the Western way of life.
2. There are a lack of ovens and refrigerators in most Japanese houses.

Meat is bought each day at the market, boned out and normally sliced. The cooking is done in an open pan over a gas ring.

The New Zealand Meat Producers Board in advertising and presentation of New Zealand meats in Japan, and other Asian markets, is confronted with many problems, but the rising tonnage of New Zealand meat into Japan each year is an example of the Board's work.

Farmers criticize the Board Officers' work in establishing new markets, but most criticism is ill founded when one sees the problems of selling and distributing in countries with such dense populations.

2. UNITED STATES OF AMERICA:

With 95lbs live weight lamb selling in Oregon for \$25.00 and farmers in that state increasing their flocks, after being solely grain and small seeds since the Second World War, it seemed to me that there is undoubtedly a good market for New Zealand lamb in the U.S.A.

The large supermarkets with their eye-catching display and goods well set out make one realize that it is a highly competitive market, and will take time to establish. But as figures show this outlet is increasing due to sound promotion work by exporters, and the New Zealand Meat Producers Board.

22. BRITAIN'S PROPOSED ENTRY INTO THE E.E.C.

To the New Zealand farmer visiting Britain this is constantly on his mind. At present the above-average English farmer under the Price Support Scheme is farming profitably, and indeed British agriculture appears to be in a sounder position than their E.E.C. counterparts.

With wheat selling at £44 a ton in France and only £22 a ton in Britain and beef selling at higher prices in France, the British farmer would like to compete on the European market in these two commodities. This would be only the short term view, but over a longer period of years he would be a little better off financially than at present.

SUMMARY

In this report I have tried to cover the aspects of British agriculture that would be applicable to New Zealand farming.

In New Zealand agriculture today there is a great need to intensify agricultural research at all levels. With a national lambing percentage of under 100 per cent greater prolificacy is needed in our flocks.

There will be an increasing demand for nitrogenous fertilizers at economic prices, and the use of irrigation in many areas for more intensive use of our cropping farmlands.

Finally the realization and need to market our increasing volume of produce on the world's markets will require a higher degree of salesmanship to offset the ever-increasing national freight bill.

This scholarship has given me the opportunity to see future agricultural trends in many parts of the world, and for that I shall always be grateful.

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