

Grassland Memorial Award

REPORT OF OVERSEAS STUDY TOUR (ABRIDGED)

G. L. BANFIELD

*Fields Superintendent, Department of Agriculture,
Hamilton*

IN ADDITION to attending the International Grassland Congress in Finland, I was required under the terms of the Memorial Award to examine the Farm Advisory Services of Britain and the U.S.A.

International Grassland Congress

Full credit must go to the Finns for the well-nigh perfect organization of the Congress. My only criticism was that four sessions were run simultaneously under the following headings : (1) Grassland Production; (2) Grassland Utilisation; (3) Plant Breeding and Seed Production; and (4) Improvement of Grass Production and Utilisation on Natural Grassland in Different Climates. By the elimination of the papers of lower standard, Sessions (1), (2) and (4) could perhaps have been combined with advantage.

As might be expected, many of the papers applied more especially to European and North American farming conditions and had little application to New Zealand. For example, 18 papers dealt with artificial nitrogen, while only four dealt with legume nitrogen. However, it would seem that, whatever the system, studies relating to hypomagnesaemia, silage, digestibility and intake and many other topics are of common international interest.

UREA COMPOUND

Many feeding experiments are being conducted in different countries to establish how much of the natural protein in feed can successfully be substituted by the synthetic urea compound. A paper on this subject by Professor A. I. Virtanen, of Finland, was therefore of particular interest. Professor Virtanen developed the A.I.V. silage-making process which is still the method used in Finland today. His studies have shown that it is possible to produce milk successfully and even increase production on a protein-free feed, using urea and ammonium salts as the sole source

of nitrogen. In countries with plenty of forests, it would seem possible to produce milk from cows fed largely on cellulose and synthetic protein substitutes.

This principle is already being used successfully by Welsh mountain sheep farmers. The rough feed available to the mountain sheep is low in protein and is being supplemented on a "self-help" basis. As a result, the lambing percentage has increased from 70% to 90%. The supplementary food is manufactured as a large block weighing 56 lb. The essential ingredients are 50% cereals, 15% common salt, 23% minerals, 26% molasses and 6% urea, together with a resinous binding material which makes the block reasonably weatherproof. These blocks are distributed over most of the mountain area, allowing one block for approximately 30 ewes. Admittedly, the ingredients other than urea could be making a substantial contribution and it would be necessary to carry out trials using the basic materials with and without the addition of urea to ascertain the part played by urea. However, it would seem that the principle could have application in the untodressed tussock grasslands of the South Island and would be worthy of some trial work.

DAIRYFARMING EFFICIENCY

Papers on the efficiency of dairyfarming in New Zealand, Denmark, Netherlands, United Kingdom, U.S.A. and U.S.S.R. were extremely interesting insofar as they described the dairy industries in these countries but lost most of their usefulness through lack of uniformity in the method of presenting production costs, returns and other measures of efficiency. To obtain the best results from future exercises of this nature, it would be useful if each participating country was asked to present its information on forms prepared by the International Grassland Association for the purpose.

A particular point of interest was the high costs of production in all of these countries (excluding Russia) in relation to the gross returns. Costs were well in excess of 80% of the gross returns, and, for U.S.A., the figures were in excess of 90%. By comparison, New Zealand costs are nearer 50 to 60% of the gross revenue.

Another striking feature is the high capital investment in buildings and plant compared with that in New Zealand.

In the U.S.A., for example, the three Lake States of Michigan, Minnesota and Wisconsin invest as much as £80 in plant and buildings for every £100 in land.

HYPOMAGNESAEMIA

Because hypomagnesaemia (grass staggers) has assumed such importance in this country, I was especially interested in the papers relating to this subject. Points of interest which arose from the papers and from discussions with Congress members were as follows :

- (1) When concentrates are being fed, the inclusion of 2 oz of calcined magnesite is regarded as being the simplest, most economical and most effective method of supplying additional magnesium. Many dairy farmers in New Zealand are now feeding some concentrates after calving and are taking advantage of the opportunity to include magnesium.
 - (2) Work in Northern Ireland has shown that it is not possible to increase significantly the magnesium content of mixed pasture by incorporating species naturally rich in magnesium without seriously reducing the output of the sward.
 - (3) Soil treatments with magnesium compounds (300 lb Mg/acre or more) are effective on light or sandy soils but are unlikely to be effective on heavy soils.
 - (4) Dusting pasture with magnesia at the rate of 15 lb Mg/acre before grazing is an effective method of preventing grass staggers and the method is independent of soil type.
 - (5) Experiments have shown that the addition of 1 ½ to 2 lb Mg/1,000 lb herbage at the time of ensiling is a useful means of providing stock with additional magnesium. Losses of magnesium during the ensiling process are very small, especially where wilted material is used. However, the silage and animals fed on the silage can be detrimentally affected if the above levels are exceeded.
 - (6) It was claimed that urinary magnesium excretion is a better criterion for determining the magnesium status of an animal than is **the** blood serum test.
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According to one paper, the available feed magnesium can be more accurately determined and a shortage can be observed sooner by this method.

SILAGE IMPROVEMENT

A number of papers dealt with the reluctance of stock to consume as much dry matter when fed as silage as when fed as hay.

It was pointed out that the voluntary intake of silage often limits its potential for animal production and unless this intake can be improved silage must remain nutritionally inferior to hay made from the same crop. This low intake has generally been associated with the higher moisture content of silage. However, experiments in which the moisture level of silage was reduced to the same level as hay, failed to improve the position. It was also suggested in one paper that the intake of silage over a long period may be limited by a low pH level associated with a high content of organic acids.

Because of the importance of silage in America and European countries, it seems likely that a considerable amount of research will be directed towards the elucidation of this problem.

New Zealand Contribution to the Congress

A total of eight papers by New Zealanders were presented at the Congress. The authors were Dr C. P. McMeekan; Professor W. Candler; Dr P. C. Barclay; N. A. Cullen; T. E. Ludecke; D. B. Edmond; A. G. Campbell; and R. J. Lancaster.

All were well received and invariably led to a considerable amount of discussion and numerous questions.

I was particularly impressed by the esteem in which the New Zealand research workers and their achievements are held. New Zealand appears to have attained a reputation in the field of grassland farming out of all proportion to its size and population.

Be-congress Tour

The pre-congress tour of Finland and Lapland, up to the Arctic Circle, included visits to many farms, research stations and other points of interest and one was able to obtain a clear picture of the agriculture of the country.

Finland is almost completely flat and stretches from 60° to 70° latitude. About three-quarters of its total area (130,000 square miles-New Zealand is 103,000 square miles) is in forest, a simple association of Scots pine (*Pinus sylvestris*), Norway spruce (*Picea excelsa*) and birch (*Betula pubescens* and *B. verrucosa*).

A feature of the country is the fantastic number of lakes-55,000 or more-covering about one-tenth of the total area of country. The combination of lakes and forest makes a very attractive backdrop to the farm land. ,

PRODUCTION

Each farm averages 22.5 acres of arable and 95 acres of forest land. The economy of 4½ million population is largely based on forest products as indicated by the following list of exports: Agricultural products, 6%; timber and wood products, 21%; pulp paper and board, 47%; metal products, 18%; others, 8%.

Finland is almost self-sufficient in agricultural products. This is no mean effort since the average grazing season is only four months and the soils in the north freeze down to a depth of more than 9 ft in winter.

The farmed or arable land is cropped as follows :

	%
Bread cereals (rye and wheat)	13.8
Fodder cereals (oats and barley)	27.5
Potatoes and root crops	4.2
Leys for hay and silage	39.7
Leys for grazing	9.8
Leys for seed production	1.0
Other crops and fallow	4.0

This supports a stock population of:

Total dairy cattle	2,058,000
Milking cows	1,138,000
Pigs	558,000
Sheep	199,000
Poultry	4,085,000

PASTURES

A normal seed mixture would consist of 15 lb cocksfoot, 15 lb timothy ryegrass, 5 lb red clover, and 1 ½ lb white

clover. The cocksfoot may be replaced by 15 lb meadow fescue and 5 lb smooth-stalked meadow grass.

Each of these mixtures has produced an average of 4,744 lb dry matter per annum, and last for a period of 4 to 6 years. Perennial ryegrass is not sufficiently winter hardy and white clover is unsatisfactory as spring and autumn temperatures are too low for it, and mid-summer conditions, with a 20-inch annual rainfall, are too dry. Red clover persists poorly when grazed and its winter survival is uncertain.

Nitrogen is applied at rates up to 220 units per acre, *i.e.*, the equivalent of 11 cwt sulphate of ammonia per acre.

Silage is made by the A.I.V. process, the meadow fescue-cocksfoot leys proving the most productive for this purpose. The silos have to be well insulated or the silage may freeze up to 6 ft in from the sides.

Hay crops are forked by hand on to poles for drying; mechanization is difficult because of the small arable area on most farms. Timothy-red clover leys are used almost exclusively for this purpose.

As more than half the cultivated area in Finland is devoted to leys, the annual requirement of seed is particularly high and although normally all the timothy seed required is grown locally a great deal of seed has to be imported.

STOCK

The Ayrshire breed is favoured in Finland although there are still quite a number of the native Finnish cattle in use, particularly in the north.

The dairy cows are claimed to have an average production of 8,934 lb of milk with a 4.5% test or 405 lb of fat per cow.

"Type" is completely ignored and dairy cows gain their places at agricultural and pastoral shows purely on their records.

Because all the beef used is a product of the dairy industry, the rate of growth of the cattle is of considerable interest. To improve the rate of growth of the stock, bull calves are reared together at bull rearing centres and only those which reach a satisfactory growth rate are proved for milk production through the artificial breeding organization.

It is claimed that there are no infectious disease problems, such as Tb, in Finland, but metabolic and deficiency diseases are a real problem. Grass staggers gives the most trouble and is increasing with the increased use of nitrogen. Bloat is still a problem on legume-free pastures top-dressed with nitrogen.

The National Agricultural Advisory Service (N.A.A.S.) of England and Wales

This organization, set up in 1946, was based largely on the organization of the New Zealand Advisory Service so there is considerable similarity between the two services.

Under the Director are three senior advisory officers whose status is comparable with that of the Assistant Director in New Zealand. Under the Senior Advisory Officer (Agriculture) are a number of chief advisory specialists in livestock, machinery, poultry and farm management. The N.A.A.S. differs from the New Zealand organization in that it is also responsible for advice in horticulture and poultry.

Just as New Zealand is divided into eight superintendencies, England and Wales is divided into eight administrative regions. During my three weeks visit to Britain, I spent a week each in the Cambridge and Welsh regions, where I was given the opportunity to interview members of the organization from the regional directors down to the technician level and observe field staff in a team. I was almost overwhelmed by the friendliness of everyone and the genuine efforts to be helpful.

Regions are divided into from three to ten counties each under the control of a county advisory officer; each county is divided into approximately five smaller units with their own district agricultural advisor servicing up to about 700 farms.

The county advisory officer is very much an administrator and carries out many of the functions of field superintendents in New Zealand. Under his control he may have a staff of over 20 officers including specialists in farm machinery, horticulture, poultry and livestock husbandry. The county advisor may be called in to assist with difficult problems but district advisors would mainly call in the appropriate specialist.

A cross-section of N.A.A.S. district advisors would be very similar to a cross-section of New Zealand advisors; some are particularly able in the field of technical agriculture, others are more adept at forward planning and management, while others fall between these two extremes.

Farming in England is becoming more and more specialized with fewer and fewer enterprises, while the size of holdings is increasing. To be of assistance to these highly-specialized farmers, it has become increasingly necessary for advisors to specialize in a particular field and this is being actively encouraged. There is also a trend towards the formation of district groups of advisors to deal with unusually difficult problems.

In New Zealand, where farms have always been highly specialized, it is much easier for an advisor to be sufficiently experienced to be able to cope with the variable demands made upon him.

There are a considerable number of specialists at the regional level, covering the science fields of bacteriology, soil chemistry, nutrition, entomology and plant pathology, and the husbandry fields of farm management, crops, grass, livestock, machinery, milk, poultry and horticulture. Each senior specialist may lead a team of six specialists so there may be up to 80 specialists on the staff at regional level compared with, say, 50 district advisors.

I was left with the impression that, at the regional level, the N.A.A.S. was top-heavy with specialist staff. For example, there were five entomologists serving the Welsh region. With eel-worm in potatoes and cereals and leather jackets as the most serious problems, it was hard to visualize how these people could be fully employed. Moreover this apparent top-heaviness tends to encourage farmers to by-pass the district advisor in some cases and go straight to the specialist. This can undermine the standing of the district advisor.

The N.A.A.S. provides a national farm business analysis service. Physical and financial information is obtained from the farmer on a form provided for the purpose and is analysed by small clerical processing units at the regional headquarters; the results are returned to the farmer on another form. This is a very worthwhile service but it is not the highly-sophisticated farm management service it has been credited with being. It does, however, provide

very useful basic information on which to carry out forward planning and budgeting and is a basis for farm management advisory work.

The U.S.A. Co-operative Extension Service

Extension work in the U.S.A. is conducted on a co-operative basis between the United States Department of Agriculture and the land-grant universities and is financed co-operatively by the State Government through its university, by Congress and the counties.

The college of agriculture of each of the state land-grant universities has a three-fold function : (1) Resident education; (2) agricultural research; and (3) extension service.

The Extension Service is organized on a somewhat similar basis to the British regional organization except that the smallest unit is the county rather than part of a county.

At the university level is the State Director of Extension, more-or-less equivalent to the Regional Director in Britain. He, like his British counterpart, is supported by a very large retinue of specialists in farm management, crops, dairying, poultry, home management, etc. At the University of Pennsylvania, for example, there were no less than 124 specialists.

A county staff normally consists of a county agent, home economist, 4H agent, resource development agent, sometimes a farm management specialist, and other specialists depending upon the requirements of the county.

Closer supervision of the county staff is achieved by the subdivision of the state into four to eight districts each of approximately eight counties under district supervisors who operate from the universities.

Funds to run the county office come from the county and include office accommodation, clerical assistance and travelling expenses. Only the salaries of the professional officers are paid for co-operatively by the universities and Federal Government, although, in some states, part of the salaries of these officers is also paid by the county.

An unusual feature of the U.S.A. Extension Service is its operation of county extension executive committees which have the responsibility of procuring adequate funds from the county authorities to run the county extension office, and to assist the county extension staff in develop-

ing its extension programmes. The county agent is required to submit estimates, an annual report and an extension programme each year to the county executive committee for its approval.

The trend in the U.S.A. is to employ staff qualified to masterate and doctorate levels for advisory work and very considerable pressure is being brought to bear on staff to obtain these qualifications with the emphasis on training in economics and social sciences rather than technical agriculture.

There is emphasis also on mass media methods of extension rather than individual farm visits; some advisors were spending less than 20% of their time actually visiting farms. In keeping with the role of universities, the emphasis is on an educational service rather than on a direct service to the farmer as in New Zealand. Because there is a very large urban population in most of the states, television and radio programmes have to be tailored to suit the wider audience. For this reason, programmes appear to lack sufficient depth to really satisfy the farming audience.

Severe criticism of the county agent was offered in some quarters. It was considered that too much importance is now placed upon the organizing ability and personality of the county staff and not enough on their technical competence.

It was also claimed that very few belonged to scientific societies and that they read very little apart from material supplied to them by the university specialists. As a result, it was contended, specialist farmers were by-passing the county agent and going directly to university and private enterprise specialists for advice.

COMPUTER PROGRAMMING

In the five states visited, the computer was being used almost entirely for farm recording and analysis work. In one state, it was also being used to prepare returns for the Inland Revenue Department. Very little actual linear programming has been carried out as yet and that which has been undertaken has been concerned with providing general guide lines for the more usual farming enterprise alternatives. Farm management specialists were stationed in about one-third of the counties in one

state, but no county agents or farm management specialists at the county level were considered capable of linear planning work. I attended a meeting of university farm management specialists from twenty of the western states, the whole purpose of which was to try to get a linear programming service to farmers "off the ground". It would seem, however, that they still have quite a long way to go.

A further feature of the U.S.A. Extension Service is the emphasis on what is referred to as "resource development". Land considered to be unsuitable for farming, or marginal for farming, may be bought for forestry, national parks, or made available for recreational purposes. Employment is found for the displaced families. A feasibility plan is drawn up for a depressed area by the resource development officer for adoption and implementation by the local authorities. The necessary leadership organization and education to implement such a policy is supplied by the extension services.

The Americans place much more importance on home economics service than is done in New Zealand and there is a home economist stationed at every county office. These home economists are moving away from cooking and sewing as subject matter and concentrating more on home economics. They are trying to encourage farmers' wives to keep farm records not only as a useful role in itself but also in the hope that it will encourage their husbands to be more record minded. They are also required to encourage family budgeting and guide the family on matters relating to nutrition. Women's organizations may call on the home economist to provide facts and figures to enable them to reach more satisfactory decisions relating to public affairs. Another important part of their work is to develop leadership qualities in 4H clubs and also in adults.

Acknowledgement

My outlook in agriculture has been broadened immeasurably by my overseas tour and as recipient of the first award made by the Grassland Memorial Trust, I would like to say how deeply conscious I am of the honour which has been bestowed upon me. I wish to acknowledge also the assistance given me by my Department in enabling me to take full advantage of the award.
