FARMING IN NORTH OTAGO

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Abstract

North Otago is a well-established, efficiently farmed district. Primary production, which grossed an estimated $20 million in the 1973-4 season, will continue to be the major source of regional revenue. The geographic character and the soil resources of the district are described with a comprehensive coverage of historical development, current farming practices and future opportunities for pastoral development. The principal factor limiting agriculture in North Otago is a climate characterized by low, variable rainfall. Pastoral potential is closely tied to investment in oversowing, lucerne and irrigation. Successful farming under difficult environmental conditions demands above-average ability. The managerial skill of North Otago's farmers is an outstanding regional resource that augurs well for the future.

GEOGRAPHIC DESCRIPTION

NORTH OTAGO is a well-defined region. The northern, Canterbury, boundary follows the Waitaki River to its snowfield source in the Southern Alps beyond Lake Ohau. Above Kurow are the hydro dams, below Kurow the river remains as a broad natural boundary, flowing in swift braided channels down a bouldery bed to the sea.

The southern boundary that isolates North Otago from its parent province is a mountain wall running north-west from Shag Point to the Lindis Pass and on to the Alps.

A fork in the mountains that sweep round from Danseys Pass to Kurow divides North Otago into two districts that are distinct in nature and development. Inland, at Omarama, the sparsely populated run country is similar to Central Otago.

Below Kurow is the more closely settled country, The mountains and foothills are only suited to extensive grazing, but most of the lower country is made up of rolling loessial downs, good natural grassland, much of it arable. There is only limited flat alluvial land. A belt of plain along the Waitaki widens as it approaches the coast. Underlying much of the downs is a broad belt of limestone running inland from Kakanui on the coast, to Otekaike.

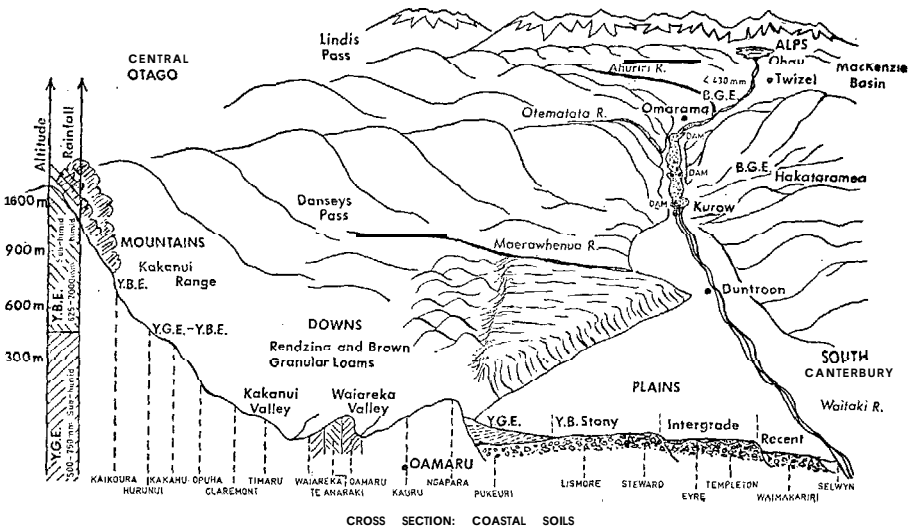

FIG. 1: *Geogrupkic profile* of *Norfk Otago.*

The prevailing native cover of the region was tussock, with patches of flax, fern, matagouri and cabbage trees. Rainfall recorded at Oamaru over 80 years has averaged 550 mm, mainly in the form of drizzle or heavier falls associated with southerly storms. Dry, mild winters are characteristic, and, though rainfall is normally sufficient for farming needs, summer droughts are not uncommon.

SOIL RESOURCES

North Otago has a varied soil pattern. Soil parent materials are diverse and include loess, schist, greywacke, sandstone, quartz conglomerate, limestone, volcanic tuff, and alluvium.

Of the 600 000 ha occupied in the Waitaki County, 74% are on hilly or steep land. The balance includes: 20 000 ha of flat/ easy rolling land well suited to cropping; 60 000 ha of flat/rolling land with moderate limitations to intensive farming owing to seasonal moisture deficits and a subsoil pan; 90 000 ha of flat/ rolling land limited to pastoral use by high stone content, shallow soil depth and poor drainage.

The seven main soil series are described below.

BROWN-GREY EARTH SOILS

Developed under a semi-arid rainfall of less than 430 mm. These weakly leached soils are found in the upper Waitaki basin. Potentially very productive, they are severely restricted by seasonal soil moisture deficits. Sulphur is the main fertilizer required under normal extensive pastoral grazing. Molybdenum is recommended for moister soils and specifically where luceme is being grown.

-YELLOW-GREY EARTH SOILS

Developed under a sub-humid climate with 430 to 8S0 mm of rainfall. The soils of the coastal downlands (Ngapara-Timaru) and the downland edge of the Waitaki plains (Pukeuri-Struan) are typical of the weakly to moderately leached members of this group.

Soils of the inland Kakanui downlands (Claremont-Opuha) are typical of the more strongly leached soils of this group. A dense, compact subsoil (fragipan) is characteristic. Weak soil structure, and seasonal moisture deficiencies can limit cropping. Relatively low fertilizer applications of phosphate and sulphur are required under typical mixed cropping land use. Molybdenum responses are general. Lime responses increase, as pH levels fall, on the moister soils. Potash reserves are adequate for pasture growth at present, but decrease on the moister soils. Lucerne is widely used on these soils.

YELLOW-BROWN EARTH SOILS

Developed in sub-humid to humid, upland and high country environments with more than 1000 mm of rainfall. These moderately to strongly leached soils are usually found above 600 m and include mountain slopes, terraces and inland basins. Typical land use is extensive tussock pastoral farming. A low pH is common and liming, though beneficial, is seldom economic. Molybdenum, sulphur and phosphorus deficiencies are present, but vary with aspect and parent material. Improvement in carrying capacity is being achieved on most of these soils by oversowing with 'inoculated clover seed in time for the spring thaw.

YELLOW-BROWN SHALLOW AND STONY SOILS

Found on the lower Waitaki plains under a sub-humid climate. These are the oldest terrace soils (Steward and Lismore) with a stony profile and a subsoil pan limiting their use to pastoral farming.

A low natural pH, variable responses to molybdenum, and high maintenance phosphate topdressing requirements following border-dyke development for irrigation are characteristic.

BROWN GRANULAR CLAY SOILS

Develoned on volcanic tuffs in the sub-humid coastal downlands. These (Waiareka) soils are weakly leached and -have a high soil nutrient status, limited only by sulphur.. Though well suited to their common use for market gardening and cash, cropping, their "tarry" nature can be difficult unless loess is present in the topsoil.

RENDZINA AND RELATED SOILS

Restricted to limestone parent materials on the sub-humid downlands. These (Oamaru) soils are base saturated with a slightly alkaline pH and a shallow profile. Sulphur responses are obtained.

RECENT SOILS

Derived from alluvium and found on river flood plains in all climatic zones. This soil group is weakly leached and sulphur and phosphorus are required. These versatile soils, and the younger yellow-grey earth (Pukeuri-Templeton) soils on the plains can be expected to give very high production and provide a wide variety of cropping and pastoral possibilities when current irrigation development is completed.

N.B.: Selenium deficiency is common to all soils.

HISTORY

European residence has been continuous since a whaling station was established at Moeraki in 1836. Pastoral grazing began in 1848 with the Otago Settlement.

Pastoral runs were made available in 1851 on a "licence to occupy" basis at a fee of £5 a year, plus £1 for every 1000 sheep over 5000, to a limit of 25 000. The coastal runs were taken up immediately, and by 1856 the Otago Provincial Council had allocated most of the land as far as Kurow.

Runholding was profitable. enough with wool stable at 15d a pound, but tenure was precarious on the more fertile and accessible land. By 1860 North Otago remained Crown Land partitioned into 30 sheep runs carrying in all 120 000 sheep, with the Oamaru settlement providing a risky sea link with the outside world.

With the proclaiming of "the hundreds" (areas of land surveyed for subdivision and freeholding) at this time, the foundations were laid for the great estates that were to be a feature of the North Otago countryside for the next 40 years.

The 1870s brought the railway. Inland from Kurow the great leasehold runs prospered with no fear of encroaching farmers. Robert Campbell still held Benmore, 101 500 ha between the Ohau and Ahuriri Rivers carrying 65 000 sheep. Below Kurow were the big freehold estates. Campbell's Otekaike holdings included 34 350 ha leasehold and 6 870 ha freehold, when he built his impressive 30-room mansion. By 1877 total sheep numbers had reached 531 690 (56% on runs) with 14 owners having 90% of them, and Campbell's flock totalling 115 000.

The 1880s brought depression. Wool fell to 8d a pound and, to add to the problem, rabbits arrived in their millions. Then in 1889 the worst drought on record set in and lasted until 1891, before it broke during controversial experiments with explosives for rain making. However, the 1880s were remarkable for two achievements in North Otago that were to influence the history of New Zealand. James Little established a new breed of sheep at Corriedale in the Waiareka Valley, and Thomas Brydone, the New Zealand and Australian Land Company's Superintendent, was asked to make the necessary preparations for an experimental shipment of frozen meat. Killing began in 1881 at the Totara slaughter-yard, and when the refrigerated sailing ship *Dunedin* reached England, the whole future of the country was transformed.

The main trends in farming from the 1930s onwards have been brought about by the relative profitability of prime lamb production and the successful introduction of rabbit destruction measures.

Low, unreliable rainfall has always been a problem. As early as 1877, the Borough of Oamaru commenced a 26-mile race from the Waitaki River to service the town.

Shortage of stock water resulted in North Otago pioneering rural water supply schemes on the downlands. The first opened at Windsor in 1954 and schemes now cover 72 000 hectares and supply 390 000 litres daily. Irrigation investigations were promoted in the 1940s when border-dyke trials on the lower Waitaki plains commenced, under the guidance of the late A. C. Hurst. Development to the present 5 500 ha irrigated has been gradual, but projected schemes are now likely to increase this area to 26 000 ha. The Waitaki River is being diverted to benefit the whole North Otago economy.

THE FARMING DISTRICT

Oamaru Borough (population 13 050) is the servicing centre and the only major town in North Otago. The Waitaki County (population 8100) is the land district known as North Otago. There are 960 farm holdings of 4 ha or more occupying 563 000 ha in the County. Farm work employs 1500 people.

The average area of holdings, 586 ha, can be misleading as there is considerable diversity in the size of farm and type of farming in the County. Market gardening is concentrated at Kakanui on the coast. Medium size prime lamb and mixed cropping farms cover the lower altitude downs and the Waitaki river plains. Large, extensively grazed runs spread along the Kakanui range, west of Kurow, then up through Omarama into the Southern Alps.

Climate is the major limiting factor. Rainfall is uneven, with a low 550 mm recorded annually over 100 rain days. A 3-month winter dormancy is accompanied by heavy frosts. Sunshine hours (2000) are above average for New Zealand. Dry summers limit the crops that can be grown without irrigation. However, cereals and small seeds can be grown successfully. Wheat yields average 3.35 tonnes/ha (50 bu/acre), but there are wide variations between seasons.

Primary production is the major source of regional revenue and is expected to gross $20 million in the 1973-74 season. Of this income, 60% comes from sheep and climatic conditions demand a high standard of management skill to budget conserved and supplementary feed for stock requirements.

Natural soil fertility has been improved by topdressing with phosphate, sulphur, calcium and molybdenum. Maintenance requirements under dryland farming conditions are low at 125 kg/ha of sulphur superphosphate biennially.

The potential for increased stock numbers is tied to the climate. Unimproved lowland carrying capacity is about 1½ to 2½ stock units to the hectare and high altitude grazing about ½ s.u./ha. With topdressing and establishment of improved ryegrass/white clover pastures, carrying capacity can be doubled on 3- to 5-year pastures, to 5 s.u./ha.

Lucerne is making a significant contribution on the free-draining low country by extending the grazing life to 10 years with an average carrying capacity of 9 s.u./ha. At higher altitudes (to 1000 m), by following known techniques of topdressing, inoculation, oversowing, and subdivision for more intensive grazing management, a threefold increase is possible, up to 1½ s.u./ha.

Irrigation offers the most spectacular improvement, with 20 s.u./ha now being carried on some properties after border-dyking of the poorest soils on the plains.

SHEEP

In the buoyant 1972-3 season, sheep farming, the major regional revenue earner, grossed an estimated $11 million. The country flock in 1973 totalled 1 056 500 sheep including 745 500 breeding ewes, 200 000 hoggets and 83 000 wethers.

Lambing percentages in North Otago are regularly in the 100 to 105 range, or 10% above the New Zealand average. This performance gives some indication of the flock's potential productivity, as a quarter of the ewes are fine-wool Merinos, Corriedales and halfbreds run at higher altitudes, where lambing is below the national average. The Romney is the predominant lowland breed, and flock lambing percentages averaging over 130% are now being achieved with irrigation development, more attention to seasonal feed requirements, and the continued trend to cross-breeding. About half the lowland ewes are mated for prime lamb production.

Total sheep numbers have remained relatively stable over recent years as both product prices and rainfall have been low. The longer-term prospects are for further substantial increases in sheep numbers through investment in oversowing, irrigation and lucerne. Projections are for 1 150 000 sheep (including 840 000 ewes) by 1980.

CATTLE

Dairy cattle have steadily declined with the remaining 3100 head concentrated around Oamaru, to fill the town milk quota.

Beef production has been increasing very quickly and an estimated 44 900 head (including 20 400 cows) are now wintered. About $1 650 000 was grossed from beef-cattle production in the 1972-73 season.

Breeding cow numbers have increased 190% over the past 5 years, with most of these cattle being owned by 50 higher-altitude runholders.

Herds of 200 or more cows are now common. The trend to running cattle on surplus tussock has led to an equally desirable fall in the number of burning permits issued.

The district favours a three-tier, high-altitude (breeding) downland (wintering), and irrigation (finishing) system of integrated beef production. This makes full use of cash cropping residues.

The current move into feedlot, premium beef production by Waitaki Industries, makes use of locally grown barley and lucerne.

Beef-breeding herds are expected to continue to increase on the moister, high altitude "gorge-type" runs. On the drier tussock country, where accumulated tussock reserves are being grazed out, declining performances and uncertainty in the beef market have resulted in a timely period of consolidation.

A continued rise in beef cattle numbers is expected. Weaners retained in the district and grown out on irrigated pastures will be major contributors, with breeding cows increasing at a slower rate. Projections are for 53 000 head (including 23 000 breeding cows) by 1980.

PIGS AND POULTRY

Pigs and poultry also contribute substantially to the regional revenue; 530 sows produce carcasses with a market value of $350 000 and 160 000 laying birds gross an estimated $1 200 000 annually. At present, however, both these industries have limitations on further development

BEEKEEPING

Honey production averages 150 tonnes and the industry grosses an estimated $135 000 annually.

Beekeeping makes a further contribution to the economy through the pollination service provided free of charge by honey bees. The value of seed produced from crops pollinated by honey bees, that is, white clover, red clover, lucerne and brassicas, can be estimated at $200 000.

Honey production can possibly be doubled in North Otago and established beekeepers are expanding their enterprises.

FLOUR MILLING

Milling standard wheat can be grown to fill the North Otago quota. The 8000 ha sown in 1972 yielded an estimated 27 000 tonnes and grossed $1 500 000. Areas sown in 1973 and 1974 have steadily declined, but the current season's crop from 5000 ha will still gross $1 500 000. This is due to the substantial (50%) increase in the basic wheat price. Aotea is the main wheat variety grown. and at $2.50 a bushel the marginal return from a typical 3.35 tonnes/ha (50 bu/acre) crop is $230/ha. This is attractive in relation to ruling sheep prices and prospects are for a swing back to about 8000 ha of wheat annually as a reliable source of

revenue in a pasture renewal programme. The trend to higher-yielding varieties, Kopara, Karamu and now Takahe, will strengthen the industry.

OTHER CROPS AND SMALL SEEDS

Cash cropping is important to the economy of the region, with some 16 000 ha of grain and seed crops harvested annually. Current estimates for gross returns are:

Barley, 5000 ha, $1 750 000.
Oats, 1500 ha, $360 000.
Kale, rape, linseed, peas and sunflowers, 1200 ha, $500 000.
Small seeds, between 1200 and 2400 ha, averaging about $500 000.

Present areas, are expected to remain about the same in total, but there are likely to be seasonal variations caused by price fluctuations and climate. Unreliable spring rainfall and hot, dry summers are limiting, and, under dryland farming, early maturing varieties of sunflowers appear best suited for further development as a specialist regional crop. Kale and rape seed crops require a long fallow to ensure establishment, and yields of peas and linseed are very dependent on summer rainfall.

In the long term, irrigatioa development holds the key to stability in yields, and diversification. Rape oil, lupins and beans could fill a growing demand for high-protein yielding crops, and the packet seed trade is a possibility.

COMMERCIAL HORTICULTURE

Horticulture makes an important contribution to the regional economy with gross earnings from market gardening of $1 000 000, glasshouses of $220 000, berry fruit of $60 000, and orchards of $50 000.

Market gardening received a boost in 1942 when the need to supply the armies in the Pacific gave impetus to vegetable production. Growers have continued to specialize in these crops, notably Brussels sprouts for which the area is well suited. Today North Otago is the main producer of this crop with two-thirds of, the total area in New Zealand and 73% of total production. Other major crops are early potatoes, lettuces, cauliflowers and carrots. About 500 ha are devoted to market gardening, but there is little scope for increased production at present.

LAND AS AN INVESTMENT

Financial backing and return on capital invested in farming will have a considerable bearing on future development and production trends. Of the $143 000 000 invested in North Otago real estate, approximately half is in rural land and buildings. In addition to this there will be some $20 000 000 invested in stock and plant.

Government and stock and station agency advances to farmers at about $10 000 000 are not high, indicating an established farming community with a low level of indebtedness. When the substantial rise in farm values in the first half of 1974 (51 sales at 30.6% above 1973 values) is also taken into consideration, the long term prospects for North Otago farmers remain attractive.

The two major investment opportunities are in irrigation and extensive grazing. In both these enterprises a return on development investment approaching 20% has been achieved when calculated at medium product prices.

Return on capital for the buoyant 1972-73 farming year, after paying wages for the owner as a manager, were 14.6 and 11.7%; respectively. At medium prices the returns would be 8%, falling to 4% when prices are at their lowest. Even the highly capitalized mixed cropping farm (without irrigation) falls within the 9 to 4% range.

The opportunity for profitable investment in both development and farming as a business should be recognized and encouraged.

THE FUTURE

North Otago is a well established, efficiently farmed district. Primary production will continue to be the major source of regional revenue. Investment in farm development, that will increase livestock production, should be encouraged. Sheep, and to an increasing degree, beef cattle, will continue as the key to the region's prosperity. Investment in irrigation will strengthen the livestock economy and will provide new opportunities for diversification in cash and process cropping. Current projections are for the present 1 150 000 stock units to increase by 10% to 1 265 000 by 1980, but there is scope for considerably faster growth.

Pastoral potential is closely tied to investment in oversowing, lucerne and irrigation. Hill and high country soils totalling 444 000 ha cover 74% of the region. Over 200 000 ha of these hilly and steepland soils have only slight to moderate limitations for pastoral development and could, by the application of demonstrated tech-

niques for legume establishment, carry a further 100 000 stock units. However, as about 90% of all high country runs are still under native cover, the real challenge lies in providing an investment climate that will motivate the landholders on the extensively grazed properties.

Flat and rolling land totals 156 000 ha or 26% of the region. The most versatile soils occur in lowland coastal North Otago and the Waitaki Valley. The principal limiting factor here is a climate characterized by a low variable rainfall. About 60 000 ha on downlands are restricted by soil moisture deficiencies, and, as most of these soils are excluded from irrigation by their physiographic situation, their immediate potential lies with lucerne. An expected increase from the 20% now in lucerne to 34% by 1980, could well continue to over 50%, giving a potential increase of 100 000 stock units.

Irrigation development will make the most substantial contribution over the next 20 years. By 1994 the present 5500 ha under irrigation have every prospect of increasing to 26 000 ha. There are about 20 000 ha of top quality arable land in the Waitaki, Kakanui and Waiareka valleys and as about half of this land is assessed as irrigable and has yet to be irrigated the prospects are most encouraging. Even with this arable land devoted to intensive cash cropping, there is still a potential for some 200 000 additional stock units as the irrigation development comes into full production.

The remaining 70 000 ha of flat and rolling lands include areas that fall outside present irrigation development, and include the large area at higher altitude in the Omarama basin.

Lucerne is already established on an estimated 5000 ha of this country and is expected to increase considerably' as the problems of higher altitude soils are resolved. The immediate prospects are for at least another 100 000 stock units, and with the eventual irrigation of the Omarama basin the number could well double.

There is a close tie between pastoral farming and regional prosperity. The demonstrated immediate potential for an increase of 500 000 stock units is a real challenge to regional developers. Incentives for the farming community, that will ensure the fastest possible development rate, are in the long-term interest of the whole community.

Successful farming under difficult environmental conditions demands above average ability. The managerial skill of North Otago's farmers is an outstanding regional resource that augurs well for the future.