

# Lincoln College

CANTERBURY AGRICULTURAL COLLEGE

SCHOOL OF  
AGRICULTURE

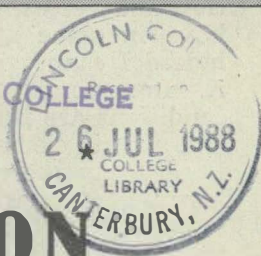


UNIVERSITY OF  
NEW ZEALAND

FOUNDED 1873

CANTERBURY AGRICULTURAL COLLEGE

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# THE COMMUNITY CENTRE

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[We are privileged to publish this series of four radio talks which were given by Mr Somerset over 2YA in August and September, 1947.—Editor.]

## III.

### LIVING AND LEARNING

In the two talks I have already given in this series I have been concerned mainly with the relationship of the centre to the community. To-night I shall talk about the kind of life that goes on in the centre itself.

In the first place, all centres have an elementary function based upon a simple need for human fellowship. The elementary centre is a place where people meet in a socialable way for talk, games, dancing, and, perhaps, gymnastics. Its corporate life takes place in a common room, a dance floor and a gymnasium; its aim is to provide recreation and refreshment after the day's work. All centres have in some measure this elementary social function; indeed I cannot imagine one running successfully without it. In some places, in those cities for instance where social conditions are poor, the work of the centre may begin and end at this elementary level. But not so in New Zealand. I feel I must be very emphatic on this point. Many people here whose knowledge of centres is confined to the reading of reports from overseas, are inclined to think that there is no more to be done than to provide a place for the "spending" of leisure—a place in which to "let up" after the day's work. To this argument there is an effective answer. Many clubs and other organizations already exist for the spending of leisure: unless we do more in our centre we are wasting people's time and neglecting more urgent needs that are not being met elsewhere.

This brings me, then, to the second and more advanced function of the centre, a function based upon man's need to learn. I know that sounds formidable, but only because we have come to associate the learning process with the immature years of childhood. And yet we go on learning, and usually very pleasantly, all through life. Young people leave school only to begin learning the intricacies of their life's work: they soon acquire along with the day's work the knowledge and skills necessary to their callings. As a mere onlooker I am always amazed at the progress they make. What, then, can I offer them when they come to the centre? Most people who are dealing

with real situations all day are suspicious of what they call "mere" knowledge. They will have nothing to do with "knowledge for its own sake"—and quite rightly. Their common sense tells them that real knowledge is knowledge that can be supplied to some immediate problem.

This does not mean that the centre should embark on vocational studies. It does mean, however, that it should be able to recognize a need for knowledge when it arises. Young men and women beginning to furnish a home need to think about design in furniture and colour in curtains, young parents find they need to learn something of child psychology or of calories and vitamins. The centre, then, must be ready to communicate such information when required. Sometimes it will be done in study groups, sometimes by individual interviews, sometimes by the simple process of lending books.

But this is only a very small part of the kind of communication of mind to mind that goes on in the community centre. There is another sense in which people are interested in learning and that is because they are members of the community of their fellows. In my first lecture of this series I said that technological developments such as the coming of the motor car and the radio continually alter the nature of the community in which we live. The effects of technological and scientific change on the lives of men is a subject of absorbing interest and one that should find a regular place in the work of the centre.

I can best illustrate this stimulus to thought and study by giving an example. One memorable morning just over two years ago the newspapers carried the story that an atomic bomb had annihilated Hiroshima. That day all the groups at the Feilding centre dropped their usual topics to talk about the bomb. This was only to be expected, because, indeed, it was the biggest piece of news that had ever come through to human beings. But it soon became obvious that it was much more than news. For the first time man had liberated elemental energy that had been frozen up since creation's dawn in the form of matter. The discussion went on and on. What is an atom? How does it split? What then is energy? But the thought that really filled everyone's mind was not concerned so much with the facts of nuclear physics as with the effect that atom splitting would have on the lives of men. Would the new discovery be turned to peaceful uses? Would it relieve man of some of his burdens, or would we all be blasted out of existence in future atomic war? Everyone seemed to recognize that while the technical processes connected with the splitting of atoms could be left to the

experts, the *social* effects of atom fission were the concern of everyone. I am inclined to think that this attitude towards living and learning is a new development in the thinking of ordinary people: perhaps it is the most hopeful development since man learned how to record his thoughts by writing.

Needless to say we began a lengthy course on the subject of atomic energy. Without going into all the mathematical and technical details which are beyond the range of everybody but the high-ranking experts, we were able to look back over the whole story of electronics. We saw that the bomb really began to fall in 1895 when Rontgen discovered X rays. We were able to look at the contribution made by the Curies in their discovery of radium, and then to touch upon the importance of Max Planck's enunciation of the Quantum Theory at the turn of the Century. It came as a surprise to most of our students to learn that as early as 1905 Einstein had written the equation for the transforming of matter into energy. We took much longer over the work of our own Rutherford who first knocked bits of energy from the atom in 1919; and over the construction of the cyclotron by Lawrence in 1929. A short excursion into chemistry showed the position of uranium in the list of the elements and threw light on the importance of the discovery of the rare variant of uranium which was appearing in the news as uranium 235.

Of course you are thinking that all this was covered at the time by articles in the popular magazines, and newspapers, and that it was mere curiosity that held the group together. Not so at all. The weakness of the magazine digest type of article is that it is lubricated and streamlined to the point where it slips through the mind without making any real difference to the mind. In order to learn we must give long and critical thought to a problem. The centre can do this by focussing attention on one problem through a long winter session. And each subject can be brought down from the isolation of academic thought by relating it to the problem of living in the world that faces every man. This is the basis of a common understanding, which, developing as you go along, forms the whole spirit of the community centre.

I must tell you of the sequel to the series on atomic energy. It often emerged in discussion that mankind is faced with a tragically difficult problem, namely, that the finest products of the human intellect are almost certain to be used in the service of our most primitive and destructive passions. Is there any hope that discoveries

made in the clear atmosphere of logical thought will ever be directed with the same logic in their use? The answer is obviously that first of all we must understand our thinking and our feelings, and by understanding give to each its due exercise and control. It was then that I was able to show that at the time when the first discoveries on the nature of matter and energy were being made, the first excursions in the new psychology were also being made. If physics is giving us a new conception of matter and energy, psychology is giving us a new conception of the mind and soul. We have a new matter and a new mind; an understanding of the new mind is necessary to the control of our new knowledge of matter. And so a course in "Understanding ourselves" was called for.

I said in my first talk that the community centre is concerned with communication of mind to mind. I have given you this description of one of our courses to show what I mean by communication. But I am sometimes asked, "If these are centres of communication, is there not a danger that they will be used for propaganda?" The answer is a simple one. There is one safeguard against propaganda—and in the centre every idea is subjected to it—and that is trial by discussion. Free discussion also makes it possible to admit topics that are highly controversial—an advantage the centre has over many other organizations.

I hope I have now made it clear that the centre is something new in community life. No extension of anything we already have can do what it does; we cannot meet the same needs by merely raising the school age, or by university extension. It differs from other forms of adult education because it is completely de-centralized and is based on the local community. It differs also in that its curriculum makes a unity in itself. It provides for fellowship and recreation and for discussion; it provides for learning at the adult level, for the practice and the enjoyment of art.

To do this calls for very careful organization, and it is the director's duty to see that a balance is maintained between the parts that go to make up the whole. I shall now illustrate this by giving you an outline of the plan that has emerged in Feilding during the nine years of the experiment.

The Feilding Centre has five main functions.

1. It is open all day and every evening for use by people who come to read, to look at pictures or to seek ways of getting help in their problems.

2. It offers the hospitality of its rooms and the use of its equipment to a number of organizations with an educational aim. Groups such as the British Music Society, the New Education Fellowship, the Young Farmers' Club, the Federation of Women's Institutes, the Gardening Circle and the Red Cross meet there regularly.
3. It brings to Feilding many of the means to study such as books, documentary films, pictures, and museum exhibits.
4. It has certain facilities for recreation.
5. It has a definite teaching policy and maintains a number of classes, study groups and discussion circles.

If you have been following this service you will see the reasons for the kind of teaching policy I shall now outline.

1. We maintain classes in child study for parents. In connection with this we have a play centre for children aged two to five with standard equipment. The centre is open on three half days per week, thus allowing mothers to do some shopping or to attend one of Mrs Somerset's classes in child study. Senior girls from the high school are given a course in child care, and get some practical work by helping in the play centre. Related also to the home are courses in food and health, in colour and home decoration.

2. Every week there is an Open Forum for the study of affairs such as I have already outlined.

3. There are intensive study groups in psychology, in the writing of English, in languages, in voice training, singing, sketching and instrumental music.

4. There are separate activities for young boys and girls of 16 to 19 years of age organized on club lines for the discussion of world affairs, for physical culture and for games.

5. We have a Family Film Club for the showing of documentary films to parents and children.

6. We give people the opportunity for the enjoyment of the arts particularly of painting, music, poetry and the drama. All these are very well attended. For the study and production of the drama we have our own little theatre where the whole art of the theatre is taught and where a high standard of production is maintained.

I shall return to the question of organization in my next talk when I shall also make some suggestions for the further development of centres in New Zealand.

# DAIRY FARMING IN NEW ZEALAND

## III.

### MILKING THE DAIRY HERD

M. G. Hollard, M.Agr.Sc., Assistant Lecturer in Animal Husbandry

The actual milking of dairy cows is a phase of herd management that is of considerable importance in obtaining high yields of milk and butterfat. Efficient milking was difficult enough to achieve when most cows were milked by hand, but with the invention and widespread use of milking machines at a time when knowledge of the milk secretion process of the cow were only dimly understood, efficient milking became an even more elusive ideal.

Upwards of 86 per cent. of all cows in the Dominion are milked by machine, while in the more intensive dairy-ing areas of Taranaki and South Auckland land districts, 93 to 95 per cent. respectively of all cows are machine milked. With the development of this widespread use of milking machines there have arisen numerous questions in connection with milking technique which have not allowed of a satisfactory answer because of a lack of knowledge concerning the processes of milk secretion. In comparatively recent years, however, much fruitful research has been directed towards providing a knowledge of how milk is made and how it can best be obtained from the cow. Even now we have a great deal to learn, but the present state of knowledge enables a fairly clear picture of the processes involved to be presented.

To provide a background for a discussion on practical recommendations in connection with machine milking, the physiological processes that occur in the secretion and let-down of milk will be outlined.

Contrary to a long-held belief, the cow secretes milk not during the actual milking process but in the interval between milkings. As milking time approaches the rate at which milk is secreted slows up and may even stop completely because of the pressure built up by the accumulating milk in the udder. Because the rate of secretion falls when the pressure in the udder rises, milking more frequently results in an increase in daily milk yield. Milking thrice daily will increase milk yield on the average by 10-15 per cent., while milking four times daily will increase the amount of secretion by 20-25 per cent., above twice-a-day milking. Milking at more frequent intervals than this gives no additional increase as apparently the pressure does not then become sufficient to inhibit secre-

tion. The increase obtainable from more frequent milking varies considerably. A greater increase is generally obtained with heifers and with high producing cows, as the pressure in such cases rises more quickly. Milking three times daily is frequently practised by breeders in an attempt to obtain high records for their stock. Under commercial conditions in New Zealand, however, the extra labour required is not usually compensated for by the increase in yield obtained.

Milk that has been secreted by the cow is stored in the tiny cells and ducts in the udder where it was made, and does not drain out by gravity. These manufacturing cells are like very small eyedroppers. In the same way as a fluid will not flow out of the eyedropper until pressure is applied to the bulb, so the milk will not flow out of the manufacturing cells until the very small muscle cells surrounding them contract. These muscle cells are caused to contract by the release into the bloodstream of a specific chemical substance, called a hormone, from a small gland, the pituitary, situated at the base of the brain. The pituitary gland, then, releases a hormone into the bloodstream; the hormone causes the muscle cells surrounding the manufacturing cells to contract; thus the milk is forced out of the manufacturing cells through the tiny ducts, and ultimately down into the gland cistern from which it is drawn by milking.

The let-down of milk is a reflex act, i.e., the response is not voluntary but automatic. It works through sensory nerves in the udder which carry the stimulus to the pituitary gland, and this gland in turn releases the specific hormone into the bloodstream. About 40 seconds are usually required after the stimulus is applied for the milk to be let down. The normal stimulus for the let-down of milk is the milking act, but cows can become accustomed to respond to a number of different stimuli, e.g., frequently cows can become accustomed to let down their milk at the sound of the starting of the milking machine, noises from buckets and cans, the washing of the udder, and other stimuli that they may come to associate with milking.

Unfortunately the reflex act of response is very easily interfered with. If the cow is disturbed or frightened, or has her attention called by any strange factor, there will be only partial response, or no response at all, to milking. Milkers who have ill-treated cows, or who by their actions arouse the cow's suspicion, prevent complete response to milking. Even factors that are sufficiently unusual to merely arouse the cow's curiosity will have a similar effect.

Experimental work has shown that the activity of

the hormone responsible for the let-down of milk is limited to a relatively short time after it has been released into the bloodstream. As soon as the hormone is released its destruction begins and it is therefore important that milking be completed before the effect of the hormone is lost.

When some of the milk is not removed from the manufacturing cells at milking time, only the milk that has been forced down into the larger ducts and into the cistern of the gland is obtained by milking. Because of the milk retained in the manufacturing cells, a pressure is soon built up by the accumulation of the newly-made milk and the rate of milk secretion is lowered. In addition, the pressure may become so great that some of the substances in the milk begin to go back into the blood stream. When this occurs, the drying off process begins and the cow will soon cease secreting milk. The best way to dry off a cow is to cease milking completely once the milk yield has fallen to about 1 to  $1\frac{1}{2}$  gallons daily in the case of a Jersey, and about 2 gallons daily in the case of a Friesian cow. The pressure exerted in the udder by the accumulated milk will prevent the secretion of further milk, and the drying off process, involving reabsorption of the milk already formed in the udder, will be initiated.

In nearly every herd there are some cows that let down their milk slowly, particularly when they have been in milk for some months. From our present knowledge of milk secretion, this can be explained by a slow release of the hormone by the pituitary gland. Experience has shown that the habit of strippers can be established by incorrect milking methods. If too much time is taken in milking, many cows will adjust themselves to the situation by only a gradual secretion of the hormone—and will have to be stripped by hand following machine milking during the latter months of the season at least.

Arising from the discussion above, a few points of practical importance in machine milking may be noted.

Heifers should be handled carefully when they are first milked. A cow must like to be milked if there is going to be a complete response to milking. Consequently, special care is necessary so that newly-calved heifers do not come to associate unpleasant sensations with milking.

Anything unusual during milking should be avoided. Strange noises and activities may attract the cow's attention and consequently prevent complete response to milking.

Cows should not be treated roughly at any time, particularly just before and during milking.

Udders should not be washed or massaged, or the cows stimulated in any other way, until immediately prior to milking.

The cows milked first should be those which let down their milk in response to preparations for milking, such as the starting of the milking machine, clanging of the cans, and so on.

Milking should be rapid. For most cows, if milking takes more than about seven minutes, the effectiveness of the hormone that is responsible for the let-down of milk will be reduced, and incomplete milking will result.

Prolonged stripping should be avoided as this will make a stripper of the cow. Many farmers have satisfied themselves that the stripping of cows by hand following machine milking is unnecessary provided the machine is in good working order. Applying some weight on the claw of the machine by pressing with the hand when the cow is nearly milked out is, on these farms, all the "stripping" that is required. For such complete milking-out to the machine to be satisfactory, however, it appears the cows must be milked in no other fashion from the start of the lactation, and preferably from their first lactation as heifers. Some cows, on the other hand, probably by virtue of their endocrine make-up, are not capable of milking-out completely to the machines and have to be stripped by hand.

Once milking has been completed, the machines should be removed from the cow immediately. Leaving the cups on the cow after the milk has ceased flowing may injure the delicate lining of the inside of the teat. It is necessary to learn to know by feel when the udder has been emptied of milk so that the machines can be taken off immediately the cow has been milked.

If these simple points are given some attention in the milking shed the greatest possible amount of milk and butterfat will be obtained from the herd quickly and efficiently, to the benefit of both the cows and the farmer.

### SUGGESTIONS FOR FURTHER READING

- Espe, Dwight, "Secretion of Milk." Iowa State College Press. 1941.
- Petersen, W. E. N.Z. Dairy Exporter, July, 1946.
- McMeekan, C. P. et al. "Principles of Animal Production," Chap. IV-VI. Whitcombe & Tombs Ltd. 1943.
- Whittleston, W. G. N.Z. Journal of Agriculture, Vol. 72, p. 449, 1945; and Vol. 73, p. 441, 1946.
- Geddes, H. N.Z. Journal of Agriculture, Vol. 73, p. 433, 1946.

# THE COMPOSITION OF SUPERPHOSPHATE

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New Zealand superphosphate contains mono-, di-, and tricalcium phosphate, free acids, gypsum, iron and aluminium oxides, moisture and combined water together with small amounts of impurities initially present in the rock and the sulphuric acid. Considerable work by the Tennessee Experimental Station indicates that about half of the original fluorine of the rock phosphate is left in the super.

A typical composition for pre-World War II. superphosphate made from Ocean and Nauru rock phosphate was:

Total P <sub>2</sub> O <sub>5</sub>	Ca (H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> H <sub>2</sub> O	31.0%	} water soluble P <sub>2</sub> O <sub>5</sub> =20.2%
expressed as	H <sub>3</sub> PO <sub>4</sub> /H <sub>2</sub> SO <sub>4</sub> (free)	1.5	
Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	CaH PO <sub>4</sub>	2.0	} =44% expressed as Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>
=46%	Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> very little		
	Ca SO <sub>4</sub> + 2H <sub>2</sub> O	54.0	
	AL <sub>2</sub> O <sub>3</sub> and Fe <sub>2</sub> O <sub>3</sub>	0.4	
	Free moisture	9-10	
	Silica, fluorine, al- kalies and trace ele- ments.	1.5	

## 5. PROPERTIES OF SUPERPHOSPHATE

**Physical:** The texture is made up of fine granular particles of varying size. Typically about 50% passes through a 10 mesh sieve (i.e. 10 holes to the inch). The density is very close to that of water. The mature super weighs 63lbs. per cubic foot. The main practical disadvantages are the ability to harden to a solid mass on long standing, and its ability to cake if insufficiently dry.

**Chemical:** There has been much controversy regarding superphosphate in relation to soil acidity. In view of overseas and New Zealand trials it is safe to say that all evidence confirms that superphosphate does not increase the active acidity (or pH) of the soil except for perhaps very high lime soils. In general it may reduce acidity slightly despite its containing an acid phosphate (calcium dihydrogen phosphate).

The chemically important properties which concern us are those bearing on general economy, such as the recovery of phosphate by the crop, the germination in the seed bed and any damage resulting from its chemical constitution. The free acids are responsible for destroying bags.

The recovery of phosphate warrants most attention.

A 10% recovery in the crop, of added P<sub>2</sub>O<sub>5</sub>, is regarded as normal in New Zealand. This is because after the application of superphosphate much of the water soluble phos-

phate is "reverted" to a less soluble and plant-available form. The phosphate is said to have been "fixed." The rate and extent of fixation vary considerably depending on various properties of the soil such as pH, the amount of humus and physical conditions which affect chemical equilibria in the soil. There is still considerable divergence of opinion among authorities as regards the nature of fixation. Dr. J. W. T. Spinks of the University of Saskatchewan considers it may be possible to use the tracer technique with radio-active phosphorus to study what happens in the soil and find a way to slow the fixation process. He has already applied this technique to wheat trials and deduced that, in the earlier stages, wheat plants obtained nearly all the phosphorus from the water soluble  $P_2O_5$  fertiliser and almost none from the soil; that after about five weeks' growth, the plants drew about equal amounts from both sources; and that when the wheat was "dead ripe" they were getting most of the phosphorus from the soil and little from the fertiliser. The amount of water soluble phosphate recovered by the wheat plants was about 25%.

Fixation is usually so rapid that phosphorus becomes unavailable because of the small depth of penetration. Tracer technique has been applied here by Heck. He treated samples of various soil types with mono-calcium dihydrogen phosphate solution containing radio-active phosphorus equivalent to one ton of super per acre followed by a washing equivalent to two and a half inches of rain, which was sufficient to wet the samples to the bottom. Results showed only one and a quarter to four inches penetration; however, it has been concluded in New Zealand that excessive losses by leaching may occur in light sandy loams.

Localised high concentrations of water soluble phosphate will prevent moisture entering the seed or plant, and even cause moisture to pass from the plant to the soil, thereby upsetting nutrient-uptake. The explanation is in terms of osmotic pressure differences between that of the soil solution and the root cells of the plant. The higher the concentration of phosphate the greater the osmotic pressure of the soil solution. For the uptake of moisture by the plant the osmotic pressure of the soil solution must be less than the plant; thus, especially on dry soils, superphosphate can be injurious to the germination of small cruciferous seeds such as turnips and swedes with which it may be sown, and may even cause complete failure. Such germination injury may be greatly reduced by using reverted superphosphate or serpentine superphosphate. This germination injury is consistent with the rule that water soluble fertilisers should not be sown with small seeds unless on very moist soils.

## 6. THE FUNCTION OF SUPERPHOSPHATE

Its function is to supply the plant nutrient phosphorus. In the early stages it promotes root development and therefore growth rate so that the crop tends to grow ahead of weeds. Crop ripening is hastened and the ratio of grain to straw in cereals is increased. It confers some drought-resisting properties to crops by enabling maturation with small water expenditure. In other words it brings about an increase in dry matter content per unit of water transpired.

It is valuable on poor grass land as it stimulates clovers generally, especially white clover. Phosphorus is essential for the activity of nodule bacteria, thus indirectly augmenting the nitrogen supply. However, nodule organism cultures may be injured if the water soluble concentration is too high. It has been found that when the phosphorus is associated with lime these organisms are especially stimulated.

## 7. THE USES OF SUPERPHOSPHATE

Apart from being the major constituent of all proprietary mixtures it is the most widely used fertiliser in New Zealand.

This section will be treated under sub-headings; the main constituent of mixtures; a carrier for deficient trace elements; application to crops.

### (1) The main constituent of mixtures.

**Serpentine Superphosphate:** This is the reversion product of "den" super, equivalent to three parts by weight of mature super, and one of finely ground serpentine rock. The serpentine has a typical composition of 35% MgO, 40% SiO<sub>2</sub>, 15% Al<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub>, 6% combined water, 3% moisture, and 1% other material. This is dried if necessary in a rotary drier and finely ground similarly to rock phosphate.

The fine serpentine powder together with water as a very fine spray are thoroughly mixed with super from the dens on its way to storage. The addition of water is to hasten the reaction, the amount being such as to bring the total moisture to 5% in excess of that in mature super.

(To be continued)

## REGIONAL SURVEY: AN OUTLINE

L. W. McCaskill, Lecturer in Rural Education

"If you know how to explore your district, you know how to explore the world."

—Le Play House.

The term "region" is elastic and difficult of definition—for purposes of a school survey it may be limited to the area which we feel directly influences our normal settled life. (For young children this will be little more than the line between home and school.)

**Regional survey** is the study of one's environment from all possible points of view. It involves:

- i. studying the past.
- ii. considering the present in the light of the past.
- iii. planning for the future.

### WHAT IS:

#### 1. **Physical environment.** Map? to show:—

(a) Position (b) dimensions (c) aspect (d) climate (e) drainage system (f) main rock and soil types.

(d) **Climate and weather** (From Government Meteorological Office get information collected at nearest station.)

Keep a record of (a) the number of days on which (i) rain falls, (ii) sun shines, (b) direction of wind each day (Beaufort scale?) (c) number of frosts, (d) outstanding events, e.g., snow, thunderstorm, (e) rainfall, (f) av. temperatures; highest and lowest temperatures.

(e) Show all main rivers, creeks and ponds. If possible show contours on map.

(f) What is the soil like? Is it all the same? Where did it come from? How deep does it go? What is beneath? Are there any cuttings or quarries to show cross sections? How far down is the water table?

(g) Vegetation.

#### 2. **Cultural Environment** (a) **General: Map** (?) to show position of townships, individual farms, schools, industry. Main occupations, main communications.

(b) **Cultural Environment Detailed.**

(i) Plan of farm land to show (a) Grassland (b) crops of various types and type of rotation, (c) shelter belts or plantations.

(ii) Plan of **live stock** distribution. (Distribution of various breeds.) Place of stock market or other means of disposal.

(iii) **Water supply.** Find how the various units obtain water, whether from wells, springs, rain water, creeks, or community pipe line. Are any of these sources liable to interruption?

(iv) **Weeds.** Make a weed survey under such headings as (a) annual crop land (b) pasture (c) waste land.

(v) **Trees and shrubs.** Locality where growing. Use made. Country of origin.

(vi) **Birds.** Distribution of birds of native and introduced kinds at various times of the year.

What is the food of each kind? What is the relation of crops to birds? What are the local enemies of birds?

(vii) **Insects.** Make a simple classification (into families) of the main insects. Discuss whether they are useful or harmful or possibly both (at different times or at different stages of the life history.) What methods are used to attack the harmful ones and assist the useful ones? Which kinds are increasing, which decreasing?

(viii) **Other animals.** What wild animals live there? What other animals are found, e.g., earth-worms.

(ix) **Power.** What is used to drive farm implements, pumps, milking machines? On map show distribution of tractors, horse teams.

(x) **Local industries.** Kind, raw materials, power supply, products, personnel (Dairy factory, freezing works).

(xi) **Local shopping facilities.**

(xii) **Markets.**

(c) **Cultural Environment. Social Life.**

(i) System of local government.

(ii) Churches and Sunday schools.

(iii) Schools.

(iv) Libraries.

(v) Halls.

(vi) Newspapers.

(vii) Telephones, radios.

(viii) Entertainment.

(ix) Place of leading citizens in the community (and possibly outside it).

## HOW IT BECAME

1. **Natural Landscape** i.e., the country before the white man.

(a) General relief and drainage system.

(b) Soils.

(c) Vegetation, e.g.,

(i) Forest.

(ii) Shrub.

(iii) Tussock grassland.

(iv) Swamp.

(d) Climate.

Can we make in the school garden a collection of plants which originally grew in the region? What native plants became pests?

(e) Animal life, mainly birds and insects.

(Try to picture the balance between plants, birds, insects.)

2. **The First Humans.** Did the Maori live here? Locate his main settlements. What sort of life did he lead? What were his methods of hunting, fishing, cultivation, building, cooking, preserving foods, clothing himself? Are there any Maori place names? What do they mean? What effect did the Maori have on the natural resources?
3. **The White Man**
  - (a) Who came first? Why did they come? Make a map showing boundaries of first runs taken up; bullock tracks, fords; what sort of life did these pioneers lead? What kind of buildings, clothes, transport, amusements, education, did they have?
  - (b) What were the first products? Timber? Flax? Wool? What kind of stock did he bring? How did he bring land into production? (Plough, bushburn, drainage?) What kind of crops did he grow? What kind of trees did he plant? Where did all these come from? (Draw a map; connect New Zealand and other countries with lines.)
  - (c) What kind of birds, insects and other animals did he bring? and why? Which have become pests? What native animals became pests?
  - (d) **What changes** have taken place in the utilisation of land with the coming of (i) refrigeration, (ii) artificial fertilisers, (iii) mechanised farming, (iv) new demands (e.g., Linen Flax).
  - (e) **Trace the changes in communications** e.g., (i) roads (tracks, clay roads, macadam sealing); (ii) horse (waggon, motor car, aeroplane, railway), (iii) letters (telegraph, telephone, radio).
  - (f) **Trace the story of power** (i) horse to tractor, (ii) wood, coal, petrol, electricity): (iii) milking machine, reaper and binder, separator, headers.
  - (g) **Buying and selling.** The story of disposal of produce and purchase of manufactured goods.
  - (h) **Destruction of natural resources.** Vegetation soil, native birds, whitebait, planning for conservation, flood protection.

**THE FUTURE, Conservation.** See Education Gazette 1941. As we study each section let us have before us the question—"How do these observations help us to understand the life of the community today?"

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