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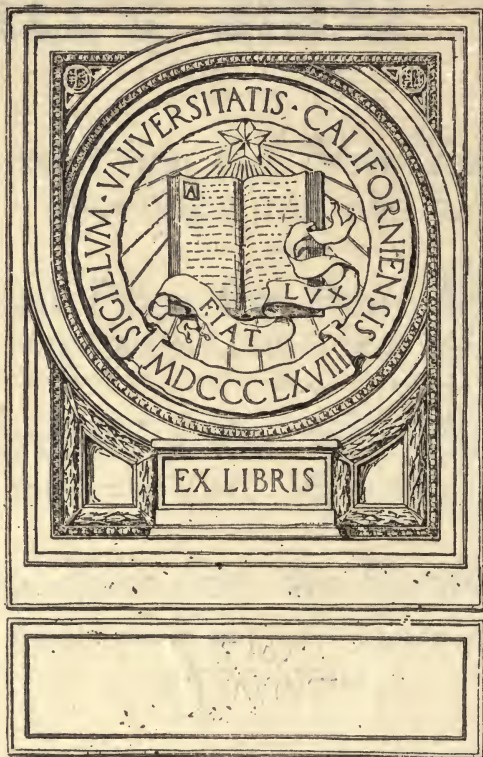
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PREFACE.

The author, when he became interested in sheep-farming, was impressed with the absence of a treatise on the subject suitable to the varying conditions prevailing in New Zealand, and decided to attempt to supply the want. He hopes his effort will be of assistance to those who contemplate engaging in the industry and to many who are already employed at it.

Part of the matter contained in some of the chapters was contributed to the columns of the "PASTORAL REVIEW," under the *nom de plume* of "Top-house," and to "DALGETY'S REVIEW," and the author desires to thank the Editors of these journals for permission to reproduce such portions as have been used.

The author has also to thank the Editor of the "NEW ZEALAND FARMER" for supplying the illustration blocks of the different breeds, and sheepfarming friends for assistance given in reading over the proofs of the book.

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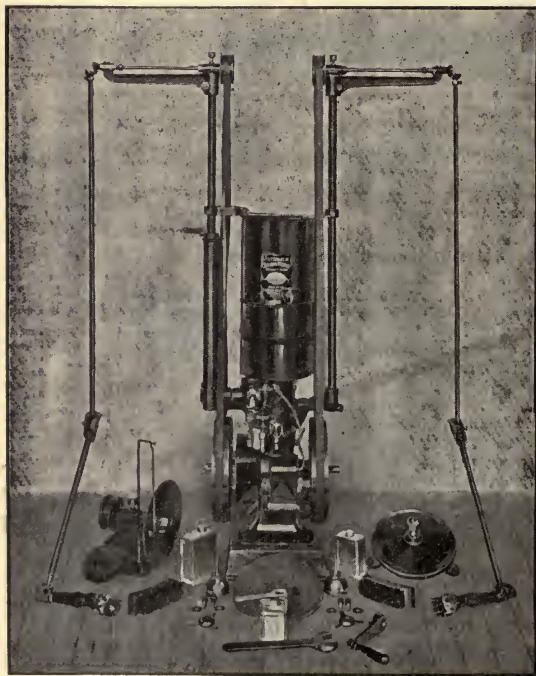
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CHAPTER I.

ASPECTS OF A SHEEP FARM.

The features of a sheep farm to come under observation are the soil, the drainage, the herbage, the climate, the shelter, and the water supply, and the more one knows about their bearing the more exactly may he determine the capacity and value of a property for the purpose of sheep farming.

The ideal soil for sheep is recognised as a sandy loam. There are all sorts of modifications in soils, however, and so long as the natural drainage of the country is good, by porosity or waterflow, the land is invariably adapted for sheep. Limestone soils are good for sheep raising; in fact a great part of the sheeplands throughout the world exhibits a greater or less proportion of limestone in its composition, visibly or upon analysis. The sea coast lands, often rough and rocky and of a sandy nature, suit sheep well, and so do the carboniferous soils of the coal regions.

Drainage may be by porosity, as exemplified by sandy soils and loams, or, on the stiffer lands, by the escape of waters into creeks and rivers. Hilly and rolling country are well adapted for sheep, there is ready drainage; while swampy and wet sodden land is quite unsuited to them. Where the land is such that water stagnates and finds no ready escape the health of a flock is always liable to be affected. Continuous damp conditions will cause internal complaints and footrot, most unwelcome and profit-destroying visitors to a flock. The original haunt of the sheep was the hill or the mountain, and the animal was naturally therefore accustomed to a dry footing, which it requires if health is to be maintained. By the handiwork of domestication, skill in

breeding, and with the assistance of time, some breeds have been established to accustom themselves and to thrive on flat lands, but the drainage must be good or they will not do well. The health of a hill flock does not require the attention that one on the flats would. The hills provide better drainage, sweeter grasses, and exercise towards the maintenance of health, for the sheep is an animal that is restless and fooms it a lot. Damp and undrained land, with its growth of reeds, flax, rough grasses, is more adapted to cattle, and unless it forms but a small part of the property, and fenced-off at that for preference, sheep are better absent from it. The conditions all round for sheep-farming in New Zealand are so favourable that there are not a great many properties that are not adapted for the grazing of sheep, mainly, or in conjunction with other stock, or at certain times of the year.

A good proportion of the shorter grasses would be in evidence upon a typical sheep farm. Such grasses do well on limestone and sandstone soils, and on hills. There are hard or Chewing's fescue, sheeps' fescue and crested dogstail, and two or three of these may be observed in proportionate accompaniment of such grasses as cocksfoot and white clover, and if the soil is not too hard or dry, with some meadow foxtail and timothy. The two latter are good sheep grasses, but they grow best on soils that are not typical sheep ones, i.e., soils of a retentive nature and more adapted to cattle and cereal growing. They do not thrive on dry hills. Kentucky blue grass is a fine sheep grass for New Zealand hill lands that are not to be ploughed, for it is of a twitchy habit; and wherever the native danthonia grass thrives it at once suggests suitability for sheep in preference to other stock.

New Zealand can claim to having the finest climate in the world for sheep farming, being neither too hot, too cold, too wet, or too dry. The annual rainfall over

the greater part of the Dominion is not too much for sheep comfort, and it is fairly well distributed throughout the year, assuring a more even growth of grass than in any sheep farming country in the world. There are exceptional seasons, naturally, but an incidence only in comparison to Australia, South America, and South Africa, where sheep farming is a leading occupation and droughts bear telling effects. But the recorded annual rainfall of a locality is not always a quite satisfactory guide in estimating exactly its sheep farming capabilities. Light showers at frequent intervals are preferable to occasional downpours that may, however, make up a considerable total rainfall. The grass is often green in the former case, and frequently dried up in the latter. A very wet climate is undesirable for sheep; they do not get a dry footing, and continuous rains, accompanied by cold, biting winds, will undermine their constitution. Sheep will overcome any temporary hardship, but unsuitable weather, long-continued, will put them off the feed and pave the way for the encroachment of disease.

The shelter features of the sheep farm are of importance, and the ideal shelter is composed of patches of bush or plantations suitably distributed throughout the property, and in such places as they will best temper the prevailing winds. Shelter will make the climate more equable for stock, will improve the pasture and make its growth earlier and more sustained throughout the year, winter and summer, will lessen the asperities of rough weather, and will make the stock more contented. A well sheltered sheep farm 1000ft. above sea-level may be said to be better than one but 100ft. above sea-level that has no shelter, and is bleakly exposed to the biting winds of winter and bleaching winds of summer. Well-sheltered stock will require much less feed to keep up condition; body heat and energy are conserved. It is not too much to say that the most useful and payable

improvement that could be undertaken upon the great majority of New Zealand farms is shelter planting. The climate is at any rate a windy one, and to take steps to moderate the effects of the cold blasts of winter and the scorching winds of summer would add greatly to the income of the farmer. A shelterless farm may be appropriately likened to a hearthstone without a fire in winter, and with a fire in summer. Aspect of the country, where it is hilly, may give one farm much better natural shelter than another. Hills or ranges favourably situated will temper the winds.

The lay of the land to the sun is a considerable matter in hilly country. The sunny side will carry more stock than the shady side, and where the land lies badly to the daily swing of the sun's rays in a valley flanked by high ranges, it is not to be compared to the other side of the valley that enjoys the beneficial effects of the sun, healthful alike to soil, plants, and stock.

Good, pure, running water is of great importance in sheep farming. New Zealand has a better supply of such water than any country, but it is necessary that access to such for the sheep may be had from each paddock of a property.

CHAPTER II.

SHEEP IN RELATION TO THEIR SURROUNDINGS.

New Zealand is by nature well endowed with respect to its suitability for sheep farming. Conditions that are favourable for sheep mean greater immunity from disease, to which the animal, under adverse circumstances, is so subject, and greater the profits obtained at a relatively lesser cost. From one point of view almost any breed would suit the average conditions prevailing in New Zealand, but from the serviceable or economic point of view such favourable conditions may the better be taken advantage of to attain a maximum of success and profit.

Methods of sheep farming are based upon profitability. What pays best is what is sought for, and the question of suitability of one breed over another will always engage attention in any country and under any circumstances. With aspects favourable it is not a matter of this breed does well, but which breed does or pays best, and although nature is so lavishly disposed towards New Zealand sheep farming conditions, the variety of geographical aspects, of climates, and quality of lands, will always create a regard for discrimination in the selection of breed.

The increase in land values, caused largely itself by improved sheep farming methods, interacts influentially towards further improvement, and the bases to work from are the consideration of market requirements and the selection of the proper breed for one's land. The day when a good clip of merino wool would cause the sheep-farmer financial satisfaction is superseded by

a devotion to cross-breeding and the co-production of wool and mutton, to provide the income necessary to pay way on higher values.

There are two prominent features in a consideration of the question of sheep selection. The country must be known, with its favourable and unfavourable aspects, and something must be known of the characteristics of the breed in view. The two matters are paraphrases of one another. If it is not a provable fact, it is an indisputable assumption that all breeds of sheep are descended from the one common ancestor, and that the dissimilarity of climate and soil, aided by the skill of the breeder, has divided the family into many distinct varieties—nearly 100—scattered throughout the world, accustomed to thrive under particular conditions that long use has made second nature to them. These varieties or branches of the original family have, quite naturally, acquired, in the course of time, characteristics which make them prejudiced in favour of the fixed idiosyncracies of their location, just like the nigger would prefer his tropical surroundings, the Esquimo his snow-bound home, and the Englishman a bracing climate.

The partiality for its special surroundings is with the sheep much more striking than with any other domestic animal, and when a breed does not do well on certain land it is proof that it is out of its element. The animal thrives in nearly every country of the world, but taking an extreme example, the breed that would prosper on the Russian Steppes would fail in tropical India. With man, the Russian could not live with impunity in the fever-infested Gold Coast of Africa, and the aboriginal from there would quickly languish in Petrograd. Likewise with sheep may be reduced the leaven of contrast to hilly and flat country, warm and exposed situations, damp and dry country, heavy and fine pastures.

Sheep, like the human family, are so divided into types, that a climate and food are to one breed what they would not be to another. Grass is the natural food of sheep, but the Shetland breed of Scotland is said to live largely on seaweed. Necessity probably with their forefathers; choice now. The Turkish porter on a diet of some figs will carry enormous loads; the French peasant will work hard on a piece of bread and an onion, and the Jap. on some rice; but an Anglo-Saxon would not only be unable to work on such diets, but would soon get ill. So with the feed customs and requirements of sheep. The heavy breeds thrive on good, easy country, growing the richer foods, but are profitless on steep or second-rate country, where the lighter mountain breeds are in their element, and turn every blade of grass into money. Although all breeds are responsive to a change to better conditions, such conditions should not, from a serviceable point of view, be of a nature that the breed has been totally unused to. It would no more pay to transfer an active and restless mountain-roaming breed to rich flats than it would to remove a heavy flat-accustomed animal to the hills. It would be possible in the course of time to radically remould the nature of any breed of sheep. It would have to be done gradually, and great loss would be incurred from a financial point of view in so altering the nature, habits and constitution of the animal. For what purpose? To adapt it to conditions to which already there is a breed more suited.

The sheep is an unhappy animal, as Virgil says, and it is known that the removal of a breed to an alien climate and soil but a short distance away will often materially affect the animal's serviceableness. The distance does not count in the reason; it is the conditions of locality. Any special interference contrary to the animal's built-up nature may not be expected to conduce to its welfare. Arthur Young, the noted English pastoral authority, states the following interesting fact,

which goes to show how much its surroundings influence the sheep. Three different flocks were grazing at freedom on the same property, with access to three distinct types of land. The flock whose parents were accustomed to rich, flat grazing took possession of same, while those whose parents were used to good hill grazing confined themselves entirely to the hills where the pasture was good. The third flock, whose parents were accustomed to poor hill pasture, sedulously grazed the worst part of the hills. There was no attempt of one flock or any member of it to straggle into another, and it was observed finally that the condition of the poor hill grazing lot was as good as any of the others. Knowledge of the climate and soil and the characteristics of the breed, it may therefore be seen, are great aids in choosing a breed for any particular land. The alternative is elusive chance with shrunken profits.

Dealing with the influence of soil alone on the welfare of sheep, it is an acknowledged fact that the wool and flesh of a sheep are but a counterpart or result of the particular plants or pasture of a soil, and the pasture or plants are likewise the result of the soil's particular constituents. The sheep is, therefore, largely what the soil, by the medium of the pasture, has made it. We know how man's condition, energy and happiness are influenced by his food. If a plant, on transfer to a strange soil and climate, will undergo, as it is well known to do, great changes, it is natural to expect that the artificially-domesticated sheep will do so even more. There is an outward change in the quality and quantity of the wool and an inward change in the flesh, great or small, according to the extent of the changed conditions. A radical change in the sheep's surroundings is against the animal's welfare and serviceableness, and is contrary to the recognised scheme of sheep-breeding. Breeds adapted to any particular sheep conditions are in existence, and it is necessary, from the point of view of profit,

to select from them the most suitable to any special aspects of climate or land, just as surely as it is necessary to graze no sheep on certain lands that are not suited to sheep.

A breed of sheep may be kept on unsuitable land for many years, but profits absent themselves, and what kind of a sheep does time degenerate it into? Proximate profits or fancy often influence farmers in their selection of kinds or breeds. Questions of the suitability of climate and land are removed from their place of central importance, and a certain breed of a certain animal is frequently introduced to the cold friendship of unsuitable surroundings. The extreme of this may be observed when land that is preferably adapted for cattle, and a certain breed of cattle at that, is used for a fancied breed of sheep, less suited maybe to those conditions than another breed of sheep. This is in conflict with the special or individual provisions of nature, and does not tend ultimately towards the greatest utility and profit of the land involved. Also it may deny to a permanent pasture—which is particularly important to a country like New Zealand, where logs and hills often preclude the renewing of such pastures—the best chance to preserve its usefulness, and therefore in measure affects the value of the land as a marketable commodity. This may be better understood when the result of continuous grazing of cattle land by sheep, or sheep land by cattle, is observed. Many pastures however, can be more profitably and successfully used for the grazing of both cattle and sheep in a proportion and manner determined by the peculiarities of each case.

To each province of New Zealand nature allots wide variations with respect to soil, temperature, rainfall, altitudes, grade of land, shelter, etc., providing if the best is to be made of the land, unlimited scope for study of kinds and breeds of stock, and their adaptability to

the conditions at hand. Not only is the pastoralist's occupation a study, but it is one of constant scientific investigation.

With respect to sheep-farmer's flocks in New Zealand, the aim is to obtain a sheep that produces a good meat carcase and at the same time grows a satisfactory fleece. The importance of this may be grasped when it is stated that the wool returns for year 1914 came to £8,200,000, and mutton to £6,300,000. A dual purpose sort of animal, like the dairy farmers are after in combined milk and beef capacity, and the poultry farmer in egg production and flesh. The cross-bred is generally conceded as the most desirable for average conditions, but which cross-bred is the question that opens up scope for disputation, which must remain disputable ground so long as climates and soils vary; observation applied to each individual property's potentialities settling it.

Broadly speaking, the breeds that are known popularly in New Zealand have characteristics that suit them to the following conditions. Good country, with abundance of rich grasses—Lincoln, Leicester, Romney. Such country is comparatively limited, cattle breeding and agriculture taking up most of it. Good and easy hilly country—Crossbreds, Corriedale, Southdown, Shropshire. High and sparsely grassed country—Merino.

Whilst the Lincoln suits good country, with not too much rainfall, the Romney will thrive where the land is poorer and rainfall heavier. Heavier the breed more suited is it to a pasture of strong-growing grasses, like cocksfoot, perennial ryegrass, meadow foxtail, and such, that grow robustly on good land. Finer the grasses, as the fescues and dogstail, whose fineness of growth is accentuated by the hills to which they are adapted, more suited are they for the grazing of the lighter or mountain breeds. Cocks-

foot is well suited to New Zealand hill lands, for it prospers and grows with a modified robustness thereon. Damp the land more call is there for the footrot-resisting Romney. Drier the country, with sparse vegetation, more is the lighter, more active, merino looked to to fill the bill. Crossing meets with the wool-cum-mutton consideration, and it is in accord with the diverse physical characteristics of the country, where upon many New Zealand sheep farms may be seen flat land, hills, and steep country.



ROMNEY MARSH RAM



ROMNEY MARSH EWE

CHAPTER III.

THE ROMNEY.

This is the most popular breed in New Zealand. It is more of a general purpose sheep than any other, giving satisfactory mutton, not so inclined to abnormal fat as the Lincoln and the Leicesters, and good wool. The flesh of the animal more nearly resembles that of the Downs breed than does that of any other longwool. Its hardiness and power of resisting footrot and fluke adapts it to conditions that are often unsuited to other breeds, and this clearly has enlarged the scope of sheep farming country. The way in which it withstands unfavourably moist climates makes it a general favourite where sheep conditions are at all doubtful, as witness its apparent success on the west coast of the South Island, where the rainfall is an excessive one for ordinary breeds of sheep. The Romney came originally from the marshes of Kent, a fine training ground for the breeding-up of a sheep to unfavourable sheep conditions, which are the diametrically opposite of the surroundings of the ancient sheep family, the hills. In New Zealand the Romney has suited itself to almost any state, and in consequence of this there has arisen contrasts of type in the animal, according to the particular country where it is pastured. Fundamentally, the breed shows less uniformity than any other, and it may therefore be realised that variety of environment conditions will help to accentuate this irregularity. No other longwool sheep shows such marked differences, noticeable in the carcass and the wool of the flocks of the different parts of the Dominion. The Romney ewe is a good mother, if not very prolific. On most New Zealand hill lands the wool of the Romney has a tendency to become light and feathery. The introduction of strong-woolled rams will

correct this fault. In respect to weight and value of fleece the Romney's would, approximately, come after the Lincoln's and English Leicester's. At price per lb. the Romney's wool would be more valuable than any, perhaps, but in such considerations with respect to the wool of any breed, moods of fashion or market weigh, and also the soil and conditions under which the wool is grown.

CHAPTER IV.

THE LINCOLN.

The Lincoln is the largest and heaviest sheep of all breeds, and requires, therefore, the best and most succulent herbage. Size of animal and fairly moist conditions, producing good feed from good land, are linked together with sheep. Like all the British longwools the Lincoln was originally a native of the rich lowlands of England. This again indicates the type of country to which it is adapted, but it does well on good New Zealand hill land. Being a heavy land sheep it will do better on clay soils than other breeds. The Lincoln carries the heaviest, strongest, and longest-stapled fleece of all sheep. Its mutton is coarse grained and fat. Its size indicates this, as also the rich pasture growth so essential to its prosperity. It is a sheep that will not stand the poor fare of poor country. Delicate in early life, once it passes its first year it maintains robustness when other longwool breeds begin to decline. In other words, it is a longer lived animal. In New Zealand the Lincoln blood is in many of the crossbred flocks, and it is prominent in the composition of the new Corriedale breed. The Lincoln ram—fine-headed ones are selected on account of the animal's preponderating size—is used largely for crossing with Merino ewes, and the Lincoln-Romney cross of the North Island is well known. The Lincoln is a most valuable sheep on



LINCOLN RAM



LINCOLN EWE

account of its great wool production, the coarseness of which is more than made good by weight of fleece, length of staple, and lustre. And the heaviness of its fleece demands that the feed conditions under which it lives should be favourable, so that the animal gets sustenance to carry the load without injury to its constitution.



ENGLISH LEICESTER RAM



ENGLISH LEICESTER EWE

CHAPTER V.

THE ENGLISH LEICESTER.

This is the purest bred sheep of all the British long-wools, and it has been largely used in the improvement of other breeds. The Lincoln, the Romney, and the Border Leicester bear a large trace of the blood of the English Leicester. Great purity of blood suggests delicacy of constitution, and this charge against the English Leicester may be best met by seeing that the conditions under which it exists are favourable. Dry, arable land, devoted to crop growing and mixed farming is a favourable lodging place for the English Leicester, but it will thrive on poorer pasture than the Lincoln. Like the Lincoln and the Border Leicester it grows a lot of fat. It is a very valuable sheep for cross-breeding, for it produces an even set of lambs than any other breed, which is another result of purity of blood, and it does not transmit any weakness of constitution to crossbred descendants. The wool of the English Leicester is of good length, lustrous, and hangs curly rather than in masses. The fleece weighs heavier than the Romney's or the Border Leicester's.



BORDER LEICESTER RAM



BORDER LEICESTER EWE

CHAPTER VI.

THE BORDER LEICESTER.

The crossing of the old English Leicester, before it was so vastly improved, with the Cheviot, produced this breed, which has the noteworthy characteristic of growing quickly a maximum of meat and wool with a minimum of food consumption. Little food is supposed to satisfy the animal, and although hardy, its rapid growing capacity is better availed of on land and with shelter that are good. The mutton has a large proportion of fat. The ewes are more prolific and are better mothers than the English Leicester. The Border Leicester ram is popular for crossing purposes, and produces excellent lambs, which, however, are not such an even or symmetrical lot as those out of the English Leicester ram.



SOUTHDOWN RAM



SOUTHDOWN EWE

CHAPTER VII.

THE SOUTHDOWN.

This is the great standard mutton sheep, which has exerted the same influence in the improvement of the Downs breeds as the English Leicester did with the longwools. It was originally bred on the chalk downs of southern England, which contain fine, sweet pasture and a dry footing, and this gives an index as to the type of country on which it thrives. It is essentially a mutton sheep, cutting 50% less wool than the longwool breeds. It matures early and fattens rapidly, and is a good breed where fat lambs are the aim. It is hardy and active, and with a fairly short and compact fleece, stands exposed situations well. A Southdown will do fairly well where a Lincoln or Leicester would do poorly, but it is not so suitable or hardy for wet districts. For the small sheep farmer it is an excellent sheep. The ewes are prolific lamb-getters and are good nurses. The ram is largely used for crossing with longwool-merino crossbred ewes, all the lambs to be sold, none being suitable for retention for a breeding flock. All the Downs breeds are very hardy sheep, and do well where longwools could not prosper. The Southdown fleece is not so heavy or so valuable as the Shropshire's; in fact in New Zealand sheep farming and crossbreeding considerations it is mutton and not wool that weighs in respect to the Downs breeds. The Downs are used to obtain the fat lamb which, ewe or wether, goes immediately to the block.



SHROPSHIRE RAM



SHROPSHIRE EWE

CHAPTER VIII.

THE SHROPSHIRE.

This is a hardy mutton breed, with early maturing and fattening qualities. It is a good forager, and is easily kept. It is larger and grows more wool than the Southdown. The ewes are first class lamb-getters, and are very good mothers. For crossing with the longwool-merino crossbred ewe they are desirable sheep, but all the lambs must go to market; the ewe lambs being unsuited for flock purposes.



CORRIEDALE RAM



CORRIEDALE EWE

CHAPTER IX.

THE CORRIEDALE.

The general opinion is that this new breed—the result of the careful selection and breeding of progeny of a cross between the Lincoln and Merino or the Leicester and Merino—seeking to permanently unite the qualities of both the longwool and the Merino, is destined to become popular. In the meantime it is not very much used, but this counts for little on account of its short history. It is impossible to build up in a day breeds of sheep with even defined qualities, and there is little reason to doubt but this useful type of animal will find a widening sphere of usefulness. The Corriedale is a well woolled sheep and, as its origin implies, is suited to moderately good country. The Corriedale ram is useful for bringing back the desirable Merino strain in crossbred flocks. Corriedales have been exported to America.



MERINO RAM



MERINO EWE

CHAPTER X.

THE MERINO.

A notable feature of the Merino is its fleece of compact, abundant, fine and yolky wool, which adheres tenaciously to its body. The Merino is a hardy, long-living animal, and, if well looked after, will breed up to 12 and 15 years. Long life means late maturity, and the Merino, both from a carcass point of view and its lateness in maturing, is not suitable, except in crossing, where sheep breeding for mutton is the aim. It is a restless sheep, disliking confinement, and naturally therefore it matures slowly. It is not at all suited to confined areas and the cultivated farm, but its useful qualities can be availed of there in crossbreeding it with the English longwool. Unadapted as the pure Merino is for mutton export, crossed it has contributed a lot of the meat frozen and shipped to England, the strain of this breed giving the fine grain in the mutton, and establishing the famous "Canterbury brand" on the London market. The bulk of the crossbred flocks of the Dominion of New Zealand have the Merino strain in them. It is a sheep with a great Australasian history, but the policy of subdividing large estates is seeing its numbers gradually thin out. Wide settlement and the Merino, close settlement and the longwool and mutton breeds, is the rule.

The Merino, by reason of its superior hardiness, is better adapted than any breed to the poorer pastures of rough country.

CHAPTER XI.

VARIOUS KINDS OF SHEEP FARMING.

The large holdings of pastoral areas are surely disappearing before closer settlement, and soon their number will be confined to holdings of more or less rough and high country, deemed unfit for subdivision. They will be the last sanctuary of the great Merino breed that has played such a prominent part in making New Zealand what she is. The frozen mutton interests have diverted the course of sheep farming largely from the Merino and wool to the crossbred and wool-cum-mutton. The Merino, however, appears as if it will always be keenly sought after by many South Island farmers for breeding half-breds, and the large pastoralist, who sees to the maintenance of a good class of Merino sheep, should derive profit from this branch of the business, and materially supplement his income, often none too certain through losses by bad seasons.

Next in importance with regard to size of flocks, is the grazier of lesser areas, not so rough or broken, and of a milder climate than the pastoral runs. The land might be said to be third quality, holding native grasses. The small run grazier has, like the large pastoralist, often to contend with distance from market, and those parts of his run that may be subject to improvement by ploughing, grassing, and cropping, have in the meantime to await improved access, which, with better prices, is coming along fast. At present he looks largely to wool as his source of income, but the time is not distant when it may as much depend upon mutton, if not directly then by supplying a good stamp of store sheep for the better and more fattening lowland country.

The owners of original bush and scrub areas, of not more than about 2,000 acres, are the most numerous sheepholders of the Dominion. Logs and stumps strew a great many of their properties, some of which were badly grassed in the first place. In numerous instances the land has gone back in carrying capacity, and improvement cannot be looked for until the timber decays and the plough set going. Even then there may be little improvement created, except in cases where there is some depth of soil. In most places there is this, but not in all. Injudicious stocking has contributed a good deal to the lessening of carrying capacity. Where rubbish enables some to get a burn, the land can be re-sown, and more careful grazing should set up an improvement, but this subject is dealt with more fully in the chapter devoted to hill pasture improvement.

A large number of farmers mix sheep with agriculture in New Zealand. This kind of farming, properly conducted, as an outcome of experience, is very profitable. The fertilising and cleansing power of sheep on cultivated lands is very considerable, and they are there to consume on the place any crop that may not be profitable to market. Skilfully worked large profits may be derived from this type of farming. It is recognised that sheep aid materially in improving good land, and are an important instrument in making a good pasture of what may be regarded as inferior land.

While the average return from sheep for the Dominion, including all classes of sheep farming, is 13/- per head, it may roughly be estimated that the large pastoralist will secure a gross income of from 5/- to 8/- per sheep; the small grazier from 7/- to 12/- per ewe, and the ordinary small sheep farmer anything from 10/- to 25/- per ewe.

The following figures show the numbers of the

different breeds, as compared to the Merinos, making up the total flocks of the Dominion in 1913:—

	Males.	Females.	Totals.
Merinos	641,819	872,854	1,514,674
Crossbreds and other longwools	6,372,332	16,304,805	22,677,137
	<u>7,014,151</u>	<u>17,177,659</u>	<u>24,191,810</u>

Generally, the Merino may be placed in the pastoral run country, and with the small grazing run holder, who will also have some Romney, Lincoln, and Corriedale blood in his flocks. The selector of felled bush areas will have crossbreds with Merino, Romney, Lincoln, and some Leicester blood. The purely agricultural farm growing root crops will use the English or Border Leicester, Southdown or Shropshire rams on crossbred ewes. In the North Island the Lincoln-Romney cross is in general use. In the South Island the Merino blood appears in most crossbred flocks, in the North Island in few.

CHAPTER XII.

VALUE AND PROSPECTS OF SHEEP FARMING.

The income provided to New Zealand by sheep farming for the year ending 31st March, 1914, reached £16,000,000. £8,200,000 of this was for wool, £6,300,000 for mutton and lamb, and £1,500,000 for by-products, etc. These important figures speak for the country's prosperity. The pastoral industry, by way of sheep and cattle products, accounts for more than three-fourths of the Dominion's total exports. New Zealand would be of but small consideration, were it not for the exported products of her pastures.

The total number of sheep in the flocks of the country is 24,700,000, and according to the above figures of income, the return per head it may be noted is 13/-. In 1912 it was 10/- per head. The frozen mutton trade has given a wonderful impetus to sheep farming, and although wool is such a large product it is questionable if it would be half as much were it not for the mutton influence. The most striking and interesting feature of the sheep farming occupation, however, is that although a great increase in the price of wool and mutton has occurred, and land development is rapidly going forward, there has not been nearly the increase in flocks one would expect, as the following figures will show:—

Year.	Number of Sheep.	Income from Industry.
1902	20,300,000	£ 7,000,000
1907	20,900,000	12,400,000
1912	23,700,000	13,100,000
1914	24,700,000	16,000,000

There is obviously a large slaughter of lambs and sheep every year to furnish the mutton export, but one would, nevertheless, expect a compensating extension of

pasture for increasing flocks, and this would be so were it not for the constant encroachment of dairying.

The values of the wool and mutton exported for these years are as follows:—

Year.	Wool. £	Mutton. £
1902	3,300,000	2,100,000
1907	7,600,000	2,800,000
1912	7,100,000	3,400,000
1914	8,200,000	4,400,000

A leading aspect of sheep farming, looking at it from a world-wide point of view, is that the total number of sheep shows no signs of increase. In regard relatively to increased population there is a large decrease. No better exemplification of this fact could be given than in the tangible increase in wool and mutton prices. Everything points to exceptional inducement to New Zealand to increase her flocks. The questionable point, however, is whether any great increase can be expected. It is true that there are large areas of native and unoccupied Crown lands and partly improved private properties yet to be developed, but for every such acre that will be allotted to sheep pasturage it is possible that an acre of the more accessible and improved land will be diverted from sheep to dairying and cereals.

Influenced, however, by the improved prices of mutton and wool, there are already signs of greater care and interest being taken in flocks and a more skilful system of pasturing and feeding undertaken. This should tend to make sheep farming well hold its own against dairying, and it is justifiable to expect such additions to the flocks of the Dominion as to increase their total to 30,000,000 within say five years. With a more generally improved class of animal in the many small farmers' flocks receiving greater attention the annual income to the country from sheep farming should, with increasing prices, soon reach fully £20,000,000.

The enlarged demand for mutton and the keener enquiry for wool may reasonably be expected to induce owners to subdivide their holdings on the ensuing raised land values and unsatisfactoriness of rural labour. It will cause others to increase their carrying capacity by fencing, ploughing, grass sowing, root and fodder crop growing, and generally encourage them to give more care to their flocks and to provisioning for bad seasons. Improvement of land in this manner may, of course, be the precursor of other farming methods, but in the meantime it should have the effect of increasing flocks to the extent indicated.

Improved methods of commerce and transport have contributed to a higher scale of living in all civilised countries, and its most striking expression will surely be evidenced in a greater demand for flesh food and woollen clothing, and this in spite of the present great war, which is merely a contest entered into to suppress a vain, decadent, and superficially-civilised people.

CHAPTER XIII.

BREED DISTRIBUTION IN NEW ZEALAND.

Each province has a few of all the leading breeds of sheep used in the Dominion, but some provinces have a very much greater leaning to a certain breed than other provinces, and to seek the reasons for this may as interesting as it may be instructive.

First of all, it is seen, according to the Dominion's total stud and flock ram returns, that the Romney breed preponderates in popularity, followed by the Lincoln, or, if the two Leicesters are counted together, these two breeds. The Romney and Lincoln are much crossed with each other in the North Island, and accounts to a considerable extent for the Romney's marked preference. In the South Island, the two Leicesters, taken together, lead in popularity, followed by the Romney. Full figures give the following:—

Breed.	N.I.	S.I.	Total.
Romney	219,744	81,868	301,612
Lincoln	86,382	9,821	96,203
Border Leicester	10,020	74,395	84,415
English Leicester	10,829	73,295	84,124
Merino	10,361	42,259	52,620
Southdown	25,782	12,322	38,104
Shropshire	6,821	12,771	19,592
Other breeds	6,778	38,894	45,672

It will not be overlooked that while the above is the return of stud and flock rams, the breeding flocks of the Dominion are mainly crossbred, with the Merino blood still prominent in many of them.

These figures are taken from the official sheep returns, which may be dissected in several other ways, and from them, by quoting in the next table the rainfall figures for each district, the bearing which rainfall to a considerable extent has upon breed distribution in New

Zealand may appear. There are, of course, other influences in breed distribution, such as quality and face appearance of land, but rainfall is always a dominating factor. In the table the two Leicesters are taken collectively, as also the two Downs breeds—Southdown and Shropshire:—

Sheep District	Rainfall. Inches per Year.	Prominent Breeds of Rams in Order of Importance.
Auckland (N.I.)	62	Romney, Lincoln, Downs.
Hawkes Bay (N.I.)	50	Romney, Lincoln, Leicester.
Wellington (N.I.)	44	Romney, Lincoln, Downs.
Marlborough, &c. (S.I.)	42	Romney, Merino, Leicester.
Canterbury (S.I.)	27	Leicester, Downs, Merino.
Otago, &c. (S.I.)	33	Romney, Leicester, Merino.

If this table is noteworthy for nothing else than the attention it directs to the small rainfall of Canterbury, and the striking absence of the Romney among the leading breeds there, it is interesting. The fairly dry agricultural areas of this province or sheep district claims the Leicesters and the Downs, as placed to crossbred ewes, as the most profitable kinds of sheep; the early fat lamb being the primary objective. The Merino provides good wool returns in its natural quarters—the mountainous back blocks—and indirectly contributes a large quota of mutton in furnishing half-bred ewes as the foundation of the crossbred flocks of Canterbury.

The preceding table shows that out of the six sheep districts the Romney is the most popular breed in no less than five of them. The three districts of the North Island—Auckland, Hawkes Bay, and Wellington—with their good rainfall, unmistakably claim preference for the Romney and Lincoln breeds.

CHAPTER XIV.

EWES MANAGEMENT.

In the tending of animals a knowledge of natural laws is an important requisite. Natural laws bear upon all things, however complex, and constructively or destructively is everything shaped in accordance with them. Domestication negatives to a considerable extent the bent of the sheep. The loss of its free, wide range implies that judgment is required to make the best use of the artificially-imposed conditions. The food may not be exactly to its liking, and the features of the fenced-in land may not be what it would choose of its own accord. The sheep has been civilised just as man has, and it is not expected that the human being can prosper without arrangements are made for his proper feeding, comfort, and health. As the scientific and the medical man aim at overcoming the ills of human civilisation, so is it a dictate to the farmers to devote skill in counteracting unsuitable sheep conditions, and making the calling as profitable as may be. Holding sheep imprisoned in the confines of a paddock without bestowing attention to their requirements is not making the best of sheep farming conditions, and it is as futile to expect the animal to respond to inattention as it is to hope for a horse to haul loads without seeing to its feeding and health.

What the breeding ewe wants above everything is reasonable treatment and good food. Wild animal life displays devotion to the obligations of maternity, and care is taken to ensure quiet and comfort for the young-bearing female. With the lamb-bearing ewe, living under the artificial conditions of confined areas, it is

necessary to give as near as can be concordant privileges, and as little disturbance as possible should be extended if the pregnant ewe is to be encouraged to express its propensity to liberally reproduce its race, and if the profits of sheep farming are not to be tagged with a heavy discount. Under good treatment lambings of 150% are not uncommon, and proper attention given to robust ewes will in favourable situations earn this high reward. Many New Zealand lambing percentages do not reach half of the natural capacity of the animal, and the mean for the whole of the Dominion is about 85%.

So that the ewe's condition of wellbeing may be thorough, the best time to begin attention to her is in her youth, as a lamb, so as to fit her properly and get her body developed on sound lines towards the improvement of future sheep generations. Great attention is wisely paid by many to the selection of the ram, and to its condition for breeding purposes, but however good the ram is, the minimising of the ewe's condition is as so much nullification of the ram's qualities.

If, as a general principle, the ewe lambs destined for flock breeding purposes are, when weaned, placed on good, clean, short grass, and afterwards on moderately good country, calling for some travelling or ranging, making the conditions conducive more to fitness by sound feed and exercise than to poorness or fatness, it is the first and best step towards making good ewes of them. They should receive a rational wintering, so that they get no check to their progress at this taxing and lowering time of the year, by avoidance of overstocking on a purely pastoral farm, or by root and fodder supplementation where the growth of such is undertaken. If a bad season pinches, the careful stocking is all that can be done on a pastoral place, and the loss of profits means also a discounted value for the land. But the supply of roots and foddere at the pinch-

ing time is exceedingly profitable. It should cost no more than a shilling or two per head, and gives extra satisfaction at the time the ewes are mated to good rams. The cost will be recouped many fold in cutting a better fleece, and in having a healthier sheep produce more, better, and cheaper and quicker fattening lambs.

There are two diametrically opposed conditions for the ewe to be in for breeding purposes—too poor and too fat. In a starved sheep there is no potentiality for breeding, and a fat cow or any fat animal is regarded as most unprofitable stock to breed from. The rule for successful sheepbreeding is to supply the ewe with a sufficient quantity of wholesome grazing that will at one and the same time impel to exercise so as to develop constitution, and create immunity from disease, thereby abolishing any probability of failure, and according favourably with the sheep's natural state. Paddocks with an all-the-year-round carrying ability of up to two sheep to the acre are suggestive. Closer the surroundings are to a natural state, where the sheep roamed over considerable areas, obtaining exercise and choosing suitable feed, more easy is it to breed up sound-constituted, hardy mothers of healthy lambs that will raise the standard of the flock, or that can be quickly and easily fattened upon the richer pastures and crops of the farm. Ewes placed in better and heavier carrying paddocks will require more attention and more frequent change from paddock to paddock. That is, better the feed heavier the stocking must be to avoid coarse and indigestible fibrous feed growth, and sooner the paddock gets fouled and health of the ewes injured by the tainted ground, if changes are not effected. Greater attention must also be paid here to the ewes not getting over-fat.

Prior to mating the ewes with the ram, particularly for the first time, or if they are anyways lacking in condition, it is a beneficial custom to put them on to good feed. A paddock with grass in good heart will do,

and immediately after lambing the food may be made as substantial and milk-producing as possible. A good warm paddock on a pastoral place, and, where roots and fodders are fed, by the supply of such of them as local conditions will permit. Hay, oat chaff, with turnips or mangolds, can all be profitable produced, and fed to sheep, trebly profitable when supplied to save the condition of the ewes and their lambs. Hay, in conjunction with roots, is a good food; the hay neutralises the wateriness of the roots, and the roots are a corrective of the costiveness caused by hay alone. If the ewe has been well done by all along she will possibly bear twin lambs, and these will make a heavy call upon her reserves, which, founded upon fair treatment, the best of food will but sustain. The difference in the profits of a well-treated ewe and one that has to run the gauntlet of a skimpy diet, cannot be told in figures. It denotes largely the basis upon which successful or unsuccessful sheep farming rests. On the one hand, a well-treated ewe will, besides cutting a weighty fleece, rear, may be, two fine healthy lambs. On the other hand, the ewe may, if bad treatment does not cause its premature demise, cut but 3/- worth of hungry wool, and possibly introduce to a miserable life only one—luckily for the ewe, the lamb, and the farmer—unsatisfactory and flock-degenerating lamb, difficult and costly to fatten. In the former case the ewe may return over 20/- a year; in the latter 10/- or less.

Sheep invariably do well on carefully-stocked pasture up to and past the shortest winter's day, after which, until the spring growth sets in, likely difficulties have to be provided for. On a purely pasture farm this will have been considered in the stocking, and where fodder and roots are supplied, sufficient will have to be provided for the requirements of the flock. The months of September and October are sometimes very hard on stock,

and provision for these months is often the token of success in sheep farming. The pasture may have been fully stocked, and, with inclement weather, the sheep are placed at a dual disadvantage. They enter the lean period on eaten-down grass that is unresponsive to bad weather conditions, and at any rate is unsustaining. The human being even thrives none too well as the spring of the year approaches, and the hard tax upon sheep, and ewes with lambs in particular, may be avoided by having a reserve of fodder and root foods to see them through. Feed like Italian rye grass, which, sown in February or early March will provide splendid feed in two months' time and right up to spring, Cape barley, vetches, steal a long march in the spring on the pasture growth, and their production makes for good sheep farming and increased carrying capacity and land values.

On sheep farms where the sole reliance is placed on pasture feed, the liability to overstock should never be lost sight of. This is the only provision here, and unless followed generally it cannot be but expected that the ewes and ewe hoggets will have a full share of the poor treatment. Wherever possible, however, it is always a good and, now with the higher prices ruling for sheep products, highly payable investment to specially feed ewes, or indeed any kind of sheep, at the bad time of the year, particularly in cold and exposed situations, where sheep short of feed have an extra trying time of it.

The steadfast aim in successful ewe management is to keep the ewes from losing their good, healthy condition, which, once built up, is difficult and costly to recover in themselves, and impossible in their hereditarily affected offspring. The tax of bearing and rearing young under artificial conditions is strain enough without having the spiritless support of unsuitable or insufficient diet imposed upon them.

CHAPTER XV.

THE RAM.

A good body, set on sound legs, and a strong neck set well on the body, with a masculine head, free from coarseness but suggestive of strength, may generally describe the look of a good ram. An all-round, vigorous appearance, with a free, easy carriage, and a bright and observant eye, are features that indicate sound health. A good, uniform coat of wool, free from the presence of hair or kemp, should be worn. Deep, broad chest development, indicates robustness, and with the well-sprung rib, are evidences that the vital organs are performing their functions healthily, and entitle the animal to reproduce its race.

A good ram will turn a second-rate lot of sheep into a good flock, and there is never any argument for using an inferior one. It is quite impossible to expect satisfactory lambs, wool or mutton, without using a good ram, whether the ewes are good, bad, or indifferent. The selection of a good ram is a vitally important point in successful sheep farming, and if one has not confidence himself in making the selection, he should entrust it to some experienced person.

Sheep, like other domesticated animals, are liable to throw back to the pre-domesticated type in some point or other, and as the pre-domesticated type of sheep did not boast of a valuable commercial class of wool, care should be taken to select rams with no hair or kemp in the fleece, otherwise the objection will be transferred to the flock. The robust male is always more liable to show this hair or kemp.

CHAPTER XVI.

CHOOSING A BREED.

In considering the question of the breed of sheep to use for the conditions of any particular locality, not only have the qualities of the land and the bearing of climate to be accounted, but the particular market it is most profitable to serve has to be weighed. In regard to the latter, if the land is good and near market, and the climate fairly humid, as it is in most parts of New Zealand, the breeding of fat lambs is the most profitable pursuit, and the fleece takes a place of minor importance. The ewe gives, say, 7/- worth of wool, and the lamb returns, we shall say, over double that, and there is generally a larger lambing percentage than is given by the purely wool ewe in its usual sphere. The extreme opposite is in the case of poor land, such as dry hills of no moisture containing ability, a distance away from market, and then clearly wool is the foremost consideration, for much flesh cannot be economically produced, whatever the breed, on such land. There is the modification of poorish land near market, where mutton growing may be strained at, and made profitable by the aid of fodders and roots, manured at an expense proportionate to the poorness of the land. And there is again the case of good land of market inaccessibility where a leaning may be made towards mutton growing, if not directly, then by the rearing of store sheep of mutton qualities, for disposal to the farmer with fattening land near market. With a moist climate the good land for successful mutton growing not only benefits by a larger quantity of succulent grass growth, but whatever fodder and root crops are grown do better. Perhaps the only chance of successfully growing mutton in a very dry

climate, and there are comparatively few such in New Zealand, is by establishing on suitable soil the deep rooting lucerne, but no methodical attempt has so far been made in this direction in New Zealand.

The dual purpose of wool and mutton is a main feature in sheep farming, and after it is seen that the land is of a nature that it is not more profitable and suited for cattle farming or cereal growing, the next best thing is to look for the best adapted breed of sheep, or cross. Reviewing the prominent breeds individually it is seen that the Lincoln, pre-eminently a great wool sheep with mutton qualities of a high order for crossing—its fatness and size must be toned down to suit the consumers taste, and the Merino blood does this—must have the best of pasture and conditions. Neither will the Lincoln nor a cross containing much of its blood succeed where the land is rough and pasture scanty. It is an easy country animal, and the easy country must have a fair rainfall to provide sufficient succulent food. Scouring a poor pasture of rough land with a heavy fleece carried on a heavy carcass could not be expected to uphold the animal's constitution. There would be no economy of purpose with regard to either mutton or wool results. Heavier the sheep is more need there is for favourable conditions, for it is a liberal food supply that has made a heavy breed heavy, and good feed grows on good, rich land, and sheep cannot succeed and be profitable on land foreign to what their forbears were accustomed to. The Leicester is not so heavy nor carries such a load of wool, but the conditions also must be good, for the Leicester is the purest bred longwool sheep, and purity of blood always means a certain fineness or delicacy of constitution requiring favourable conditions.

The Border Leicester is of more robust constitution, but the environment chosen for it is of a favourable class, for it makes good use of such by rapid maturity, and

consequent profitableness. The Romney is noted for its soundness of constitution, and it and its blood in a cross is of particular value where there is dampness of conditions making liable to footrot. All English long-wool breeds, to do themselves justice, require essentially succulent herbage, a fair amount of which a moist climate provides, and stand in contrast to the Merino breed, which will thrive on poor, dry country, giving meagre pasture, and to the Downs breeds, which are more adapted to a medium state of pasture—not too dry and sparse, and certainly not too moist, for the Downs, like the Merino, are very subject to footrot, and require a dry footing.

CHAPTER XVII.

FLOCK IMPROVEMENT.

Prime lambs are now selling at such a satisfactory price as to induce some farmers to dispose of their best and keep their inferior ewe lambs to breed from or pass on to another. Such a practice is near-sighted, and cannot be too strongly condemned. It creates retrogression in flocks, lessened profits, and recoils upon the sheep farmer himself in depreciating the profitableness of the occupation, and in its ulterior effect of making the land used for sheep farming of less value. Sheep farming is considered the most interesting occupation in Australasia, and the way to make it still more interesting and profitable is for those engaged in it to keep on improving the class of their sheep, which is a fascinating and highly profitable study. A person who has not some such desire with regard to his flock is better out of the occupation, for he derives but poor pleasure from it, unstable profits, and gives no moral help to his fellow sheep farmers.

Culling for disposal of the inferior members of the breeding flock is the essence of remunerative sheep farming, and unless the rule is methodically carried out opportunities for gain are squandered in supplying feed to wasteful stock to support the growth of poor wool, deficient lambings, and inferior, slow-growing mutton. It is only by watchfulness that the best of anything is attained and maintained. The professional and the business man know this. Jettisoning the dross is an everyday practice. The vegetable garden and the agriculturist's field are economic institutions by virtue of weed eradication, and the wide application of stud stock

rearing is sufficient to prove that selection is a most important factor in flock improvement and successful sheep farming. There are always faults or room for improvement in anything, and the ewe flock is no exception to the rule. In fact, culling is a prominent feature in the improvement of the best stud flocks.

More than one opportunity for culling to improve the breeding flock is available during the year. An examination of the ewes as they come to the shearing board may be made for faults in the quality and quantity of the wool, and all with weak wool or uneven fleeces should be marked to the skin for disposal. Bare bellies, bare legs, those too fine or too coarse in the wool should be singled out. The breeder should cull to the attainment of an ideal in view, and will seek to establish a family likeness in the flock, which makes it of much greater value than one of nondescript unevenness. The ewe that does not carry a good fleece is not an acceptable member of the breeding flock; neither itself nor its descendants will cut the most satisfactory fleece. While attention is given to all this it should not be forgotten to see that the ram is of a proper stamp for mating with the flock.

When putting the ewes to the ram a thorough and patient examination of each animal should be made, and those with defective teeth and udders and bad legs should be withdrawn from the flock. Where early lambs are the aim, large frames, well sprung ribs and fine bone give satisfaction, and where flocks are moderate in size and under the eye of the farmer throughout the year he may be able to single out and reject the ewes that gave him poor lambs the previous year. Ewes with dry, pale skins will give a poor fleece, and the carcase growth will not be satisfactory. When the teeth begin to go sheep should be culled. Young sheep

are more profitable than old ones. They cost less to keep by about 20%, and they cut fully 20% more wool. Their wool also is of greater value, and altogether it has been proved that it costs nearly double to grow the same quantity of wool from old sheep as it does from young ones. Young sheep count better in both wool and mutton returns. The older ewes, of course, make better mothers than the quite young ones, but when the ewes are very old they cannot furnish sufficient milk for the lamb, for their failing teeth prohibits them, on ordinary pasture, from keeping up their condition. A systematic yearly culling of the inferior and ageing ewes, and saving of the better ewe lambs, will keep the flock permanently young and improving, and earning greater and greater profits.

CHAPTER XVIII.

CROSSBREEDING.

Crossbreds, to do well, should have fairly good pasture at the least. Rapid and profitable mutton maturity require this. There should be defined method in the system pursued in all crossing. Without discrimination the flock will be of a nondescript character, disappointing for the owner or a purchaser to look at. The great bulk of the flocks of the Dominion are composed of crossbreds, and provide most profitable returns where careful methods are pursued, but there are many flocks that do not tend towards the best results. There is the blood of so many different breeds in some flocks that a permanent-flock sheep farmer often finds that he has to do heavy and constant culling if his aim is a satisfactorily even flock. Changing and chopping around in the selection of the ram will not assist towards obtaining for one's land a suitable breed for the environment, and will never attain that most desirable aim in evenness of flock, nor will it ever determine satisfactorily what the particular blood it is in a cross that gives whatever success may be obtained.

The Lincoln, the English Leicester, the Border Leicester, and the Romney ram cross well with the Merino ewe. When the Lincoln is used the ram should have a small, fine head, and the ewes should be roomy and robust, otherwise the tax upon the smaller Merino ewe at delivery may end fatally, and when the Border Leicester is used on the Merino the ewes should also be roomy and robust.

The half-bred is produced by the above crosses, and by placing the same kind of ram again to the half-bred

ewes the crossbred, so much prized for mutton-cum-wool, is obtained. To maintain the crossbred calibre, with an increasing leaning to the mutton side, the use of the original sort of ram is continued, but it is apparent that this continuance sees the Merino influence virtually disappear. When this transpires many farmers place a Downs ram to the ewes, so as to get early fat lambs, all of which go to the shambles, none of the ewe lambs with the Downs blood being desirable for retention for breeding from. To maintain the desirable crossbred qualities with a due proportion of the Merino blood, many have successfully re-introduced the Merino by using a ram of this breed. But, continuing to use Downs rams on the crossbred ewes of long-wool preponderance the ewes are finally fattened along with the lambs and sold, and the farmer seeks for the acquirement of a new breeding flock, unless he has on hand a small flock of Merino breeding ewes so as to yearly supplement the farm flock from half-breds, which may only be done on a large and well equipped sheep farm.

The Merino is the foundation of the bulk of the South Island's flocks, and now that the breed is becoming scarce it perplexes many what is to satisfactorily replace the highly prized product of the half-bred long-wool-merino ewes. The crossbred with the Merino strain bulking sufficiently is what is sought. Some farmers, as stated, are satisfied in bringing back the Merino strain by using the Merino ram, what is termed a come-back, but it is not generally followed, although there appears to be no strong reason why it should not. This is the opportunity for the Corriedale, and the use of that breed is on the increase. The Merino is not now generally used in the North Island for even the foundation of crossbred flocks; the Lincoln-Romney cross composing the calibre of most of the crossbreds flocks there.

CHAPTER XIX.

THE LINCOLN - ROMNEY CROSS.

Variety of country calls for variety of breeds of sheep, just as varieties of sheep call for varieties of country. The breeds suited to the hot plains of Australia or the Urals of Russia are not what are called for on the average New Zealand country. This difference in sheep conditions is well exemplified in the singular popularity of the Lincoln-Romney cross in the North Island of the Dominion. The cross, which is probably unknown elsewhere in the world, has come into vogue as the result of experience, observation, and practical trials. Special conditions call for it, and the stock farmer's aim is to take the most profitable advantage of such conditions by selecting the most suitable sort of animal.

The type of country covered by the cross is fairly diffuse with respect to climate, which is generally moist, and the appearance of the land is from flat to high, and in some places fairly rough. A great part of it is fallen bush land, log strewn, which has been sown down in English grasses. The general appearance and feed capacity of the country suggest it as a lodging place for a rather large type of animal, active and hardy. The Lincoln-cum-Romney supplies this, and the abundant feed of English grasses, seldom under two sheep to the acre, and a necessity for such an animal, is there.

The Lincoln itself is out of the question for such conditions. As a lamb and hogget it is not generally robust, and the fleece in such country is a big encumbrance. The Lincoln would come to the shearing board in a poor condition, weighed down with a profusion of exhausting matted wool in unsuitable surroundings.

The already more or less delicate constitution in early life would not be improved. The Romney, on the other hand, would come to the shearing board parti-fleeced, the charcoal of the burnt timber in log country breaking the finer fibred and more upright wool, which would be readily torn off by logs, branches of trees, stumps. The Lincoln has the type of wool and the Romney the constitution and sound hoof, and the blend seems to be all that is desired for the special conditions, and its adaptability to the country concerned seems to brand it as a cross of marked utility. The fleece of the cross rapidly dries after rains, which is not the case with the Lincoln, and this, where there is much wet, has an important bearing upon the health of the animal. Half or three-quarter Lincoln-Romney ewes make first-class mothers for the rearing of fat lambs.

Objections have been heard to the cross, but they are more on theoretical than practical grounds. The best objection should come from those who have tried the cross and compared it with other crosses or breeds on the particular country involved, and they don't seem to make their appearance. It is argued technically that a cross of a full-lustre woolled sheep such as the Lincoln with a demi-lustre such as the Romney is wrong in principle from a wool point of view. This is met by the contention that the large numbers of farmers who use the cross are satisfied with their wool returns, comparable at all times with the wool returns of other breeds and crosses, and the fact that the scope of use for all or any wool is much increased of late years, and wool is by no means the sheep's chief source of income from such good country, even were the Lincoln-Romney wool of an unsuitable kind, which it most certainly is not, for it is much prized by the American wool buyers. But overbearing any objection is the argument that the cross is one eminently adapted by size, constitution, soundness of feet, good lambing, wool and mutton return, in

an environment that requires a special kind, and cannot be criticised until a suggestion offers for a more suitable sort to take its place, and one seems to look around in vain for this. Neither does the Merino or Leicester, or their blood influence in a cross, suggest the qualities contained in a Lincoln-Romney cross for the particular conditions involved.

CHAPTER XX.

THE USEFULNESS OF THE MERINO.

Although the scope for the use of the Merino in New Zealand is diminishing before closer settlement, better access, greater demand for mutton, it may, nevertheless, be remarked that there are certain classes of land, particularly in the South Island, which it might be more profitable to devote to the Merino than to crossbreds. It is seen that the crossbred is sometimes used on country that appears to be essentially the home of the Merino—poor high land, dry, growing native grasses or tussock, and in places covered with a good deal of fern or scrub. Considerable mortality may frequently be observed amongst crossbreds on such country in a bad season, poor lambings, and the flock comes to the shears with but a poorly-grown fleece. All this prompts the question if the best is being made of the particular class of country involved.

At a sale of Merino sheep in New Zealand a little while ago, no less a sum than 26/- was obtained for young Merino ewes, and the consideration whether it would not be a more profitable investment to breed Merinos on country which nature eminently designs as their quarter, for their good and sure return in wool, and for the purpose of supplying Merino ewes for half-breeding purposes, may very well be entertained. There is a strong demand for the Merino ewe in the South Island for half-breeding purposes, and it is not long since a section of the farming press of the Dominion recommended that Merino ewes should be imported from Australia to meet the demand. Half-bred Longwool-

Merino flocks are very popular in the Canterbury Province as the genesis of the crossbred mutton so successfully grown there.

The crossbred to succeed and be profitable requires reasonably succulent food growth, and there is a minimum of this on the type of country described, particularly in a dry season. There is, of course, the personal predilection for using the crossbred, and this carries with it the easy liability to overlook natural conditions. When anything over £1 is obtained for a Merino ewe it obviously suggests profitableness in Merino sheep farming, and where two Longwool crossbreds are kept on such land returning a precarious profit three Merinos should do much better. This is a factor in itself that should weigh. Figures might be compiled to show that on much of the country under consideration a decided advantage rests in favour of the Merino. In using the Merino there would be the problem of dealing with the wether, but it would always cut a valuable fleece, and, fattened, should command a satisfactory price in the local market in these days of growing meat scarcity.

There are large areas of country in New Zealand, in any country, that will never be capable of subdivision, that are inherently poor, and it appears that a considerable portion of such country is being used to carry stock that it is not fundamentally adapted for, and the growing scarcity of the Merino and demand for the ewe of that breed should draw attention to a way of making more profitable use of such country.

CHAPTER XXI.

SHEEP FEEDING.

Freshly grown, sun licked grass, is what the sheep thrives on, what it has been accustomed to thrive on for ages; it is succulent and nutritious, tasty and sustaining. Grass is in a prime state for grazing when light or sun is plentiful, when gentle breezes stir the air and supply the plants with an abundance of carbonic acid gas, when water is forthcoming in mists and rains, causing the minerals and decomposed vegetation of the soil to become solvent and feed the root system. During what may be termed the cool or moderate times of the year. With such grass in reasonable supply, come and go, throughout the year, the conditions for sheep are ideal, and, providing the surroundings are hygienic sheep ones, health is assured.

But the grass is not always in a prime assimilable or nutritious state. Much wet weather makes it slushy, watery, and winter growth with a maximum of cold or wet and a minimum of wholesome sun is, when it is not quiescent, unsustaining. Condition making of the sheep is here suspended, and supplying appropriate substitutes for the subtracted qualities of the pasture prompts itself. The burnt appearance of grass during a dry summer spell does not suggest the pastures unsuitability for sheep, for they will do very well upon this sun-cured feed and fatten, but they should have plenty water, for the moisture in the grass has evaporated. The saccharine and fattening properties are there, but the digestive and solvent aid of water is particularly required.

In its free and natural state the sheep would, when favourable pasture feeding was unavailable, change its grazing quarters or resort to an altered diet composed of

such things as scrub, bushes, leaves of trees, etc. In the winter time the Shetland breed of sheep supports itself on seaweed and shell fish, and a Nova Scotian coastal wild sheep descended from a domesticated breed, does practically likewise. The salt bushes of Australia are a great reserve for sheep during droughty times. But such things as scrub, bushes, etc., quite inferior as they may be for the domesticated sheep, are not generally available on the fenced-in sheep farm, and an experienced sheep farmer, recognising seasonal necessities, counts all this, and figures out according to local conditions that the cost of growing such immeasurably superior things as roots, hay, oats, catch crops, is well recouped by condition saving and making. Money and time are conserved; the farm carries more stock, and it stands appraised accordingly. With the ewe, for instance, if it is not properly looked after and fed—not overfed, for fat-feeding a breeding ewe or any female breeding animal is a mistake—its growth, robustness, fertility, wool and mutton transmitting qualities, will be affected, and its descendants will not rejoice in improved physique or constitution.

Proper and change food, according to the season's requirements, has a marked, immediate, and ulterior effect on the profitableness of sheep farming, and growing fodders when weather conditions are favourable to their growth, and feeding them when weather conditions are unfavourable to the sheep's growth, is the acme of scientific sheep farming, for it harnesses the sun and other elements in favour of the farmer. There is quite obviously an artificiality about the treatment and prosperity of a domesticated animal at any time, and nothing is so consonant with that treatment as providing artificial foods when conditions emphatically suggest their use. The sheep is a good animal exemplar of high profits for good treatment, and low profits for bad treatment. It can withstand cold and exposure well provid-

ing feed is available in reasonable quantity. In high country much wet and cold with decimate underfed flocks, but with a reliable supply of food the sheep, including ewes, and lambs too, receiving adequate nourishment, will not only resist a lot, but flourish. The sheep is a restless and spiritless animal, whose constitution readily caves in to bad treatment. It may, in truth, be said that no sheep can be properly healthy and profitable unless it receives sufficient suitable food, and good running water wherever possible, which is just as much of a necessity. The worst treatment that sheep can receive is to be placed on insufficient and unsuitable feed; the best treatment, on a proper supply offering variety with gradual and not with radical or sudden change. No animal appreciates variety of food so much as the restless sheep. A breeding flock badly dieted may return a profit on the venture of a few shillings per head, or a loss, but one well managed and reasonably fed will return something nearer and even over £1 per head. What science there is in growing wool and mutton, after the breed is selected for the particular country, rests largely, under modern conditions of sheep farming, in the study of appropriate and balanced feeding—grazing the pastures with economy and care, to extend their usefulness as far into the unfavourable season as possible, and supplying substitutes when nature, by cold or drought, calls upon the pastures to halt their activity and take rest. It is only with the immovable or fixed things in creation, such as plants, that the seasons suspend or make active growth; in the animal section growth or thrift should be continuous.

CHAPTER XXII.

ROOTS AND FODDERS.

Dependence on pasture growth generally extends in New Zealand from about October to March. The growth then is fairly reliable for fattening purposes or good condition maintenance. For the other six months of the year these ends are only intermittently attained on pasture growth, and sheep have often to put up with a scanty or watery and poorly sun-strengthened growth, or one of inferior, sun-cured grasses that may be more or less soiled or rotted—grasses that have been allowed to get away by the stock on account of their inferiority. The position obviously suggests the taking of steps to create a more proportionate perennial thrift of the animal towards a greater and better output of wool, mutton, constitution, and fecundity. Thrift should be continuous with stock, and there is every encouragement to make it so by growing special crops on the good soils, with the favourable climate and rainfall of New Zealand. The number of fodder and root crops that can be set on a journey of successful growth when the elements of sun and rain are favourable is very great. They come in for direct use at several periods of the year, or can be conserved and fed to sheep as opportunity requires. The grasses and the great lucerne may be made into hay; oats may be grown, cured and chaffed; rape and thousand-headed kale are valuable fodders, and turnips and mangels are roots of importance to the better carrying on of the sheep industry. Peas are a good and profitable topping-off food for sheep, and it often pays well to use oats for the purpose. It is surprising the small attention that is paid to the growing of lucerne. Probably the time will come when a good part of the

feed consumed by sheep in New Zealand will be composed of lucerne. Variety of food plays a more important part in successful sheep farming than is generally recognised. Sheep are fonder of variety than any other animal, and as fond of it as man, and variety does the sheep more good, for it lives entirely upon the almost continuous pleasure of eating.

CHAPTER XXIII.

SMALL FLOCKS.

The serviceableness of the sheep in New Zealand is not at all confined to spacious areas of mountain, hill, or dale, for the successful operations of many small agricultural farmers are largely due to the profitable influence of the animal. As prices for sheep products are, a carefully tended flock of a few hundred sheep will provide a most satisfactory income to a farmer from a small area of land, growing root and fodder crops to be fed to the sheep on the place.

The sheep's direct and indirect influence towards profitableness on a mixed farm is very marked. Even on flat, rich lands, essentially adapted to cropping and grazing cattle, there is a lot of feed that can be turned to account by one of the heavier breeds of sheep. Pasture patches, ignored by other stock, and weed growths, are wastes, when not a nuisance, and sheep will profitably transform them into mutton and wool while cleansing the land and fertilising the soil. Any agricultural produce that might have to be carried to a depressed market can be inverted by sheep to the portable products of wool and mutton, that command staple and rising export prices. All, too, without robbing the land of its heart and strength; indeed, adding to it. Sheep will physically improve the texture of the soil for grain growing, and are particularly useful in consolidating, and conserving the moisture in light soil. They act as a most efficient roller on light rolling and hilly land that requires compacting for the better growing of a crop, and saving of the land's mineral and decayed vegetable matter from loss by heavy rains; land that is not easy to satisfactorily roll otherwise.

Professor Wrightson says that sheep are the means of nearly doubling crops of barley, oats, and wheat, and that hay and root crops are made incomparably better by them. A flock upon the farm can at any time stay a profuse pasture growth which otherwise might go to waste and cause trouble and loss in grazing. Sheep will also feed in a paddock after it has been grazed by horses and cattle, and will pleasingly even-up a pasture. Their restless movements make of them efficient manure distributors. By manuring the flats with artificials, and growing crops, and feeding them to sheep, and allowing the sheep access to the rising ground, a farmer can have his adjacent hill land manured cheaply.

Prices for sheep products are so satisfactory that with a permanent flock upon the farm it will pay to grow special crops to keep them going and making condition in times of weather severity or drought. Besides having always on hand a reserve of hay, catch crops can be grown and fed to sheep. The land's fertility, carrying capacity and value will be enhanced, and whatever extra feed is provided for the pinching time of the year will, with careful grazing of pastures during the balance of the year, enormously increase the carrying power of the farm.

Sheep and appropriate working of the land and cropping, with the start of a cheap minimum of artificial fertiliser, will transform second rate land into real good cropping or grazing country. So responsive is the pasture growth in New Zealand for the greater part of the year that it is possible to double and treble the number of stock carried on many sheep farms by growing proper crops. If successfully done the labour bill will not interfere much with the substantially increased capital value and earning power of the farm. The climate's action on the pasture growth is more favourable in New Zealand than in any other country.

While it is not possible to go in for breeding sheep on a small place, if the area is at all considerable a little skilful arrangement will make it quite feasible. A small yard and an improvised dip can quickly and cheaply be erected. If the land is inclined to be damp conditions are not favourable for a permanent flock, although some sheep may be pastured during the drier months of the year and sold, or removed to the higher ground in the winter time. The labour required in the attention of sheep during the year is small, and the trouble is a minus quantity if the fences are secure.

CHAPTER XXIV.

THE SCOPE FOR INTENSIVE SHEEP FARMING.

A New Zealand farmer lately described to a meeting of farmers how £700 a year is earned from an area of 40 acres devoted to sheep. Lucerne and rape are the mainstay; five acres of the former and three of rape, with the whole farm, which is not the very best of land, divided into ten paddocks. The lucerne is made into hay. Naturally there is an element of "dealing" in the operations as carried out in this case, for it would not do to keep a permanent flock on such a circumscribed area. The following account of the transactions for one year indicates the course pursued:—Bought 430 ewes in the autumn; had a 127% lambing; sold all the first lot fat to the butchers for 21/-, 21/6; in December all the ewes went off fat, and a line of wethers were purchased to be also fattened before it was necessary to obtain the breeding ewes for the coming winter.

No definite experiment has been made with lucerne alone and sheep in New Zealand, but it is known in Australia that an irrigated lucerne paddock carried 75 sheep per acre for four months. The lucerne, which was cut and fed to the flock in an adjacent paddock, was growing just as vigorously when the sheep, at the end of the time, were disposed of. Last winter a South Island farmer, from two acres of pitted mangolds, fed, with some straw, a flock of 400 ewes through the winter in good style.

These are bases that give great inducement to a consideration of intensive sheep farming. Regard must be given, however, to the points surrounding the undertaking in other respects. It does not do to close feed and

close herd sheep for a lengthened period; there must be range for exercise for the breeding flock, unless with buying and selling opportunities favourable, such is not kept. Necessary care and attention must be devoted, particularly to that of treating the cropped areas well, and it must be seen that the land and the climate are adapted. If in addition to the above fodder and root areas, a further area of 200 acres of fair grass land, or 400 acres of inferior, goes along with it, there is the opportunity of successfully running 1,000 sheep on a property of such dimensions, suitably fenced and grazed, particularly if an extra paddock of lucerne is available for green feeding and occasional grazing, or some other cognate feed grown, for the range of fodders and roots need not necessarily be confined to those named.

That the sheep themselves could be availed of as an excellent means of keeping the cultivated parts in a high state of fertility, and indeed improving the whole farm, if skill in grazing is used, there is no doubt, for the animal exercises a powerful influence in the direction of fertility. If the special crops grown get a send-off with a suitable artificial fertiliser, the sheep will speed up the transition of an ordinary cropping paddock into superior land.

A certain amount of labour is involved in undertaking such a method of sheep farming, but it is insignificant in comparison to onerous dairying. Attention, more than labour, is the requisite. When the intensive sheep farm is small and the soil good a system of "flying stock" farming may only be pursued. Market must be close, which it invariably is in such a case, and the soil must be light enough to withstand impaction under constant heavy grazing, fences secure, and each lot of ewes must go before health is affected by prolonged close folding. Where a breeding flock is to be kept, and this gives additional interest to any system of sheep farming, it seems as if the more satisfactory

size of farm for the practice is one of from 200 acres upwards, not necessarily of first-class land, and it should be in a fairly humid district, for reliable crop growth is essential. Carried out under whatever conditions, it should at any rate be seen that the area devoted to lucerne is carefully treated and sown to ensure a successful establishing of this valuable fodder. Large cuttings from small areas economise labour. Thorough treatment and working of the cropping paddocks require also to be undertaken, together with a judicious subdivision of the whole farm into well arranged paddocks. Very often the price of oats is so low as to make it payable to feed them to fattening sheep, and supplying under certain conditions some of the concentrated foods may also often pay, particularly when the great benefit sheep's manure does to the land is considered.

CHAPTER XXV.

LAMBING.

Three or four weeks before lambing time the ewes should be dagged, and if crutching is followed, any wool that might hinder the lambs from sucking may be clipped in a careful manner. Rough handling of ewes in lamb is very reprehensible.

A well-sheltered, sunny paddock should be selected for lambing. Inclement weather and exposure are great enemies at this time. If bush, hedges, decayed logs, or hills do not provide shelter, it should be furnished in the shape of windbreaks of scrub or straw. Sooner, however, good, permanent shelter is provided, where it is wanted, the better, for the property will then be regarded as a more suitable one for sheep, and be valued accordingly.

Dogs should be strictly kept away from ewes heavy in lamb and at lambing time. It is prime folly to have any other state than that of quiet and comfort at this juncture.

When the lambs begin to arrive the flock should be visited constantly, and assistance given to ewes that require it in their delivery. A short, practical experience or direction by a neighbour is the best way to learn how to help. When the front feet and the head of the lamb do not appear together assistance may be given by pushing back the part of the lamb that emerges untimely. Sometimes the hind legs are the first to appear, and the ewe may be successfully delivered this way; but if all the legs or the back show first help is necessary, and a careful effort should be made to push back the part appearing prematurely, and turn the lamb, so that the front legs, with the head, or the hind legs, may be got hold of and the ewe gently assisted, in unison with her efforts in travail and without any dragging. Carbolic oil should be carried so as to smear the hands after each operation.

CHAPTER XXVI.

SHEARING THE FARMER'S FLOCK.

The shearing shed should be well cleaned out, so that no rubbish gets mixed with the wool, to depreciate its value. If the sheepyard is not paved, the grass should be allowed to grow before shearing, so as to avoid dust. Dust spoils the appearance of wool. Sprinkle water to keep it down where necessary.

The sheep should be dry or shearing should not be proceeded with, and when the weather is inclement the shelter of trees, etc., is a great comfort to newly shorn sheep, and often saves the lives and health of many.

The wool table, about 7ft. x 5ft., is made of battens about $1\frac{1}{2}$ in. wide, with a space of about $\frac{1}{2}$ in. between each, to permit of the locks or second cuts to fall through. When the fleece is placed on the table, outside uppermost, the stained and fribby pieces should be taken off the edges, and after shaking the fleece to rid it of dust and short pieces, it should be rolled, from the breech to the neck.

When the flock is small this is all the wool classing that is necessary. When a fleece is decidedly below the standard of the flock, or is dirty, it can be pulled to pieces and thrown in with the short pieces.

CHAPTER XXVII.

DIPPING.

The dipping of sheep is not compulsory in some countries, but where it is increased production of wool and excellence of mutton are prominent features. Although certainly not accountable for it in full, it may be stated that the wool production per head in non-dipping countries is as low as even 2½lb. average per sheep, and in countries where dipping is general it is as high as nearly 8lb. average per sheep. Dipping is rightly compulsory in New Zealand, and it is only a matter of time when it will become so in all countries of pastoral and agricultural stability, and where sheep farming is followed on business or commercial lines.

The sheep cannot be expected to contentedly dispose itself to thrive on the pasture when under the thralldom of irritating parasites, to which, of all animal covering, wool gives the finest sanctuary. If insect pests impel the sheep towards restlessness, it will manifestly fall short of its maximum capacity of wool and mutton growth. The fence and shepherding have domesticated the sheep and made it a more social animal. Its forefathers lived a free and roaming life under a more natural state. The sickly ones dropped out quickly as unfits; but under modern conditions a sickly sheep, or a dirty one, infects the other members of the flock, and parasites are quickly passed from one to another. The sheep's health—for many troubles can be avoided by cleanliness obtained in dipping—upkeep of condition, and contentment, and therefore mutton and wool production, are improved by proper dipping. There is no argument in favour of taxing the sheep with the maintenance of any other life but its own, and the animal in

its own efforts to rid itself of the pests by rubbing against fences, etc., tears and loses a deal of its fleece and ceases to thrive properly.

Though experience clearly proves the necessity for dipping sheep, there are, nevertheless, some points in connection with the manner in which the work is carried out that tend to show an insufficient appreciation of the great benefits to be derived from a thorough performance of the operation. It is a most striking fact that a very large proportion of sheep owners do not devote care in performing the work. While every experienced sheep farmer admits the necessity for dipping, probably not 20 in 100 fully realise that it is of primary importance to have the work well done to insure the most profitable results. No matter what preparation may be used the manner in which it is used is only second in importance to the intrinsic merits of the preparation itself. To anyone familiar with the work of a sheep farm, thoroughness in dipping sheep is singularly wanting, and he cannot but observe that the majority of dippers simply "run the sheep" through the bath, taking it for granted that by ostensibly complying with the law and getting the unpleasant work over, some miracle will secure the satisfactory results. This but stultifies the benefits that science and skill place at the door of the sheep farmer.

It is needless to set forth all the conditions for complete success in sheep dipping, seeing that whatever is the brand or make it is the custom to attach directions for use on every packet or drum. One or two of these conditions, however, are of such leading importance that brief reference may be made to them. The first is to exercise sufficient care in mixing the preparation; to use measurements and not guesses; and to thoroughly distribute the dip throughout the bath water at just the direction strength. Another point is to keep the water thoroughly stirred during the dipping, for the reason

that a proportion of most dipping preparations is not intended to dissolve at once in the dipping bath. By sufficiently stirring, the still undissolved particles are kept in suspension, and are thus carried out by each sheep, and, becoming dried on the fleece, afterwards help to preserve it from re-infestation for as many months as possible. If sediment is found in the bath after dipping, apart from the droppings of the sheep, one may rest assured that he has been proportionately neglectful in this respect. Another important point in securing the best results is that sheep should have sufficient growth of fleece to enable them to carry out of the bath enough dip to insure protection, and, therefore, two months after shearing should be the minimum interval before dipping. It is also importantly necessary to be most careful to insure sufficient immersion. Merely wetting sheep instead of dipping them yields only trivial results. The fleece and the insects infesting it must be thoroughly soaked, otherwise the insects quickly regain the chance of resuming their annoyances and depredations. In carrying out these requirements little is added to the labour of dipping, but much to the profit which dipping yields. The waste from careless dipping aggregates an immense annual loss to the sheep farming industry.

Not only is care necessary in conducting the operation, but also in selecting such weather conditions that are not detrimental to the realisation of best results. Should, for instance, heavy rain fall on newly dipped sheep and before the dip has dried on to them, a large proportion of the remedy will be washed away, and the consequent effect of the work be rendered more or less transient. To regain lasting results in such instances sheep would require re-dipping at reduced strength, but not within three weeks after the first dipping. While rain has this detrimental effect on newly dipped sheep, if it falls instead some time after the dipping it greatly enhances the effect in re-wetting the fleece, and so reviv-

ing the activity of the dip which had become dried on to it. The effects of dipping are thus never so complete in a dry spell following dipping as in a moderately wet season. These remarks particularly apply to the use of the poisonous dips of lasting properties. Quickly acting dips of the carbolic or non-poisonous liquid class are of more transient effect. It should be added that the use of any home-made, unscientifically prepared dip is reprehended by all wool and sheep experts, and dips composed essentially of lime and sulphur or crude arsenic are not only destructive to the wool directly, but prejudicially affect it also by their inimical effect upon the skin of the sheep, which is, after all, the soil upon which the wool grows.

The nature of the water used in dipping is of importance. When the water is hard the difficulties not only of imperfect mixing but also of penetration through a greasy fleece affect results. These difficulties can, however, be greatly lessened by adding common soda to the bath water, at the rate of about 2lb. to every 100 gallons of water. This soda requires, of course, to be first dissolved in hot water before being stirred into the bath. A very general means of mitigating the detrimental effects of hard water is to add to the bath water, into which a poisonous dip has already been mixed, a non-poisonous fluid dip at the rate of about one-third gallon to every 100 gallons of bath water. This most effectively augments the penetrativeness of hard water, and, at the strength mentioned, it can be safely added to the poisonous dip without the least risk. In using short baths this advice is increasingly important. Every sheep owner should have a dipping bath on his own farm. It is a valuable asset, for it insures the chance for dipping to be done properly and without the annoyances, loss of time, and risks attending the travelling of sheep for it to be done elsewhere.

Some New Zealand flock owners consider it a beneficial thing to dip their ewes and lambs twice in the year. First, with a non-poisonous or carbolic preparation, soon after shearing, when the wool is short. The lambs, which are dipped at the same time, should be forward enough to look after themselves, in case their mothers, after the ablu-tion, are inclined to disown them. By the adoption of this method, the lambs are saved from the ticks which migrate to them from their mothers at the shearing, and the latter are also kept clean for two or three months, at the end of which period the lambs are strong enough to be again dipped with the ewes in the more efficacious poisonous preparation, possessing more lasting properties than the non-poisonous dip, for the reason that by its presence in the fleece the newly-hatched ticks, as they issue from the eggs, sicken and die. Only poisonous dips possess these protecting and lasting properties. This method of dipping ewes and lambs at the shearing, and again subsequently, obviates two losses to sheep owners. It saves the lambs at a sensitive age from attacks of insects, and the hoggets from the annoyances of ticks.

CHAPTER XXVIII.

WATER SUPPLY.

Fresh growing pasture, upon which the sheep thrives so well, contains a large percentage of water, for the soil, as the feeding intermediary of such grass, is moistened by rains. Sheep can do very well without water when grazing upon pasture that is in such a state, but the pasture is not all the time in this condition. In dry weather, or in country that is deficient in rains or dews, the need for an available supply of water is clear, otherwise the working of the digestive organs of the sheep becomes disorganised by an oversupply of dry, moistureless feed, and instead of putting on or maintaining condition, the sheep goes back. The feed is not being made the best use of, and the animal becomes thriftless. Even in moist sheep country there are times of the year when a dry spell reduces the water in the grass to under the quantity that is required by sheep, and they look around for the running creek.

More particularly is abundance of water necessary when sheep are fed upon artificial foods of a heating nature, and it is always incumbent to have it available for animals that are being fattened. When the grass is dried up by a drought it is freshly cured by the sun and contains good fattening properties, but its feeding must be accompanied by accessibility to water. Much loss of sheep in Australia through drought could be avoided if sheep had access to water. The feed is often there, of a very dry nature certainly, but the water is unavailable. Without water, in a dry spell, sheep have to contend with the manifest disadvantages of assimilating dry food, difficult to digest, and with great and taxing heat, which draws upon the animal's reserve strength. The drain of heavy perspiration is unreplenished, and the actions of the digestive organs are put out of gear. It is quite impossible to expect sheep to thrive under such unnatural conditions.

CHAPTER XXIX.

SALT FOR SHEEP.

On a large property sheep invariably obtain salt in some of the herbage to satisfy their needs, but on a sheep farm of moderate dimensions, and where artificial grasses have been sown, there is a strong craving for salt. All animals in a natural state roamed about a lot and came across salt grounds or herbage possessing a good percentage of salts. This they will invariably get on a large sheep farm containing natural pasture, but in the confined paddock, of English grasses particularly, and still more particularly where artificial foods are furnished, the supply of salt is strongly advisable. This is well evidenced by the sheep's great fondness for it under such conditions. In moist, damp situations, too, salt is a powerful preventive of the parasitical stomach complaints sheep are so subject to thereon. Salt aids the digestion and invigorates the system, two great essentials in the production of quickly grown mutton and of a good fleece, and the flesh of sheep is made sweeter by supplying salt.

More artificial the system of feeding sheep is more requirement there is for salt. An experiment in relation thereto, conducted by the French Government, may be quoted. The period covered by the experiment was 134 days, and the feeding was highly artificial, consisting of hay, beans, potatoes, and straw. Those sheep that received $\frac{1}{4}$ oz. of salt per day gained in that time $4\frac{1}{2}$ lb. more weight than the sheep which received no salt, and cut $1\frac{3}{4}$ lb. more and better wool. These figures show an extra return, at our prices, of over 2/- per sheep for mutton and wool for the 134 days, or say 6/- per sheep per annum. This, of course, is on extra

artificial feeding, which hastens on maturity in contrast to our pasture grazing; but for pasture grazing only the supply to flocks of a few pounds of salt per head per year would mean a substantial increase in wool and mutton returns, and repay manyfold the infinitely small outlay in trouble and cost. Artificial feeding and salt and access to water are an essential combination in successful results. The value of salt in unfavourable sheep conditions is very great. It is a deadly enemy of internal parasites.

Salt, ordinary coarse in preference to rock, may be given to sheep by itself in a box, placed under a tree, or with a raised roof providing protection from the rain, or, it may be given along with other sheep tonics, especially during the spring and autumn, when the sheep's state requires stimulus to resist disease: 100lb. salt, 6lb. lime, 3lb. sulphate of iron, with, sometimes added, 1lb. flowers of sulphur, all mixed, is good. This is much liked by sheep, and anything that is liked by an animal does it good by bracing up the system. And the above acts as a safeguard against internal complaints, and helps to cure them.

CHAPTER XXX.

SHELTER.

The need for housing of stock in Australasia is absent, and for this reason Australasia steals a long march on almost any other great pastoral country in the world. Belts of timber or hedges will provide all the shelter that is required at any latitude or any altitude. But even such a form of shelter is, in New Zealand, rather conspicuous for its absence. And too strong a complaint cannot be laid at the pastoralist's door for this, for New Zealand is not an old country, and the pastoralist is pre-occupied with other matters in the shaping of his property from a crude wilderness or forest to a comfortable family belonging, with often not too much money to do it.

Blessed as New Zealand is in genial climate, it should nevertheless be understood that sensitiveness to weather and season changes is a relative consideration. The Canadian or Russian could sleep out comfortably in our winter, but not after he had resided in the country for some years, much less so his descendants. Similarly with an animal. Under any conditions of climate shelter is a necessity. No race of human beings exists without a sheltering habitation, and all animals by natural choice avail themselves of the use of shelter against unfavourable conditions, severe or slight. There is a finesse about comfort and thrift at any time. In the lower scale of nature, too, down to the tree or grass, shelter is arranged for one way or another; the large tree has the shelter of the smaller ones, and the small that of the large ones, and grasses shelter one another. But the domesticated animal has often no choice in the

matter, and it cannot be said that its domestication is complete without the privilege of shelter is available, by way of tree, hedge, or otherwise.

Sheep farming is the mainstay of Australasia. It furnishes the material for our almost entire prosperity, and the magnitude of the benefits arising from shelter to the industry may well be closely reviewed. It cannot be overlooked first of all that a property with a judicious planting of timber has a very much greater attraction to the eye than one that has not. It is, as a matter of fact, very much more valuable. Intrinsically, we find that shelter for stock provides protection from excess of cold and excess of heat. It brings the domestication of the animal more to the real plane of such domestication. Where a large area of land has belts of timber or hedges planted at discriminate distances apart, or is broken by hills or undulations, the velocity and intensity of the cold and hot winds are found to be broken. Not only to the stock does this give warmth or coolness, as the case may be, but to the soil, and the grasses or the crops. It is a threefold benefit to the stock; they enjoy more equable temperature personally, which adds to their condition; they get a better pasture supply, and have the opportunity of protecting themselves under the shelter or on the lee from trying heat, rainfall, sleets, or maybe snow. The effects of winter's storm and cold and summer's heat are moderated. There are breeds of sheep, of course, that can withstand all these things better than others, but permitting them to so do is not according with the positive law that everything in nature seeks shelter under whatever conditions. Even if the accepted principle were to breed-up stock to a withstanding resistance of all the forces of constant changing climate, which is absurd in the consideration of anything but stationary plants, still, the artifice of the sheep farmer in shearing his sheep calls for a corresponding move to give protection from the ill effects of exposure after de-

nuding the animal of its fleece. Then again the ewe in its natural state would select a sheltered spot for lambing. A chance storm, and what true barometers animals are, would not hurt its lamb or itself. This cannot be said with the ewe living in the bare exposed fields of a property. Shelter also is beneficial to sheep after dipping. Stock, if given the chance, will avail themselves of shelter every day of the year, and it cannot be contended that the opportunity to so do is not of the highest economic benefit to the owner of the stock, whose aim is to maintain thrift and hasten on maturity. Proper shelter for sheep provides more and better wool, more and quicker growing mutton, more and better lambs, less disease and better health all round. Lack of shelter takes from an animal, pampered and softened by domestication, that which it had free recourse to in its natural state.

CHAPTER XXXI.

WOOL AND ITS GROWTH.

The technicalities of the wool trade do not appeal to the ordinary sheep farmer. He can, however, gather information in respect to the treatment of his sheep from a simple study of the common points of interest attached to and surrounding wool that has left the sheep's back. He can note from the remarks and criticisms passed upon wool as it passes on to the manufacturer that proper husbanding of his flock is essential to the satisfactory growth of a fleece. He can realise that wool is but the product of the soil, less perishable than food or grass, and that equivalent care is necessary in the cultivation of the fleece as in the securing of a satisfactory agricultural crop. He can also observe that when the conditions tending to a valuable growth of fleece are lacking the general bodily and mutton welfare of his sheep will also show shortcomings. He can note such things that the less densely covered longwool breeds do not withstand climate asperities so well as the denser woolled Merino and Downs breeds.

Every sheep farmer desires to grow good wool in preference to inferior. The nearest thing approaching and comparable to wool is hair, and inferior wool may be likened to hair, either coarse or thin and poor. To conceive the relationship and yet the great difference between wool and hair is of advantage. Where sheep are well bred there is an absence of hair or kemp in the fleece, but badly bred or inattended they grow a good deal of hair, which much depreciates the value of the fleece. Allow any breed of sheep to revert to a natural wild state and it would not be long before it developed hairy tendencies. The proper husbanding of the animal makes for wool production in contrast to a hairiness if

neglected. Wool may be said to be the result of sheep culture. In contrast to hair it is what grows on the sheep by a long course of domesticated attention and selection.

The distinguishing features of wool as compared to hair are that it is of a finer and denser growth, and that its fibres have waves, curls, or crimps, and, as observed under the microscope, cone-like serrations. These crimps and serrations facilitate the working of one fibre with another into a manufactured article. Hair is entirely, or practically entirely, deficient in crimps and serrations, as well as in softness, fineness, and elasticity, and it is therefore unsuitable for the great manufacturing purposes of wool. Breeders know that odd reversion or throwing-back to the pre-domesticated type may be expected in animals, and in the case of sheep tending in this direction in respect to their wool, care may be taken to see that the ram used has no hair in its fleece. Being naturally the more robust animal, the ram is more likely to show it, and if care in selecting the ram is exercised the tendency to hair in the fleece will not be transferred to the flock.

The Merino has from 12 to 30 waves or crimps to an inch of wool fibre, the Southdown 10 to 18, and the Lincoln only 2 or 3. The Merino has about 2,400 serrations per inch of wool fibre, the Southdown 2,000, the Leicester about 1,800, and ordinary crossbreds about 1,000, with inferior wools as low as 500. Merino wool, which has high felting qualities on account of the greater number of serrations, is soft and warmth giving. It is eminently adapted for such things as flannels, blankets, broadcloths, jerseys, etc. The Downs wools are adapted for flannels and hosiery, and where the staple is long for cloth. Lincoln wool is too coarse for such purposes. It is used in making serges, dress goods, etc. Each breed's wool is valuable for some special purpose or purposes, and the best object to attain from the wool-

grower's point of view is to grow the wool of the particular breed he is concerned with as well as may be. Certain land and conditions may be suited for the breeding of a fine woolled or a medium or a coarse woolled sheep, and the farmer's aim is to grow the wool of whichever breed he selects as satisfactory as he can. Wool from badly-bred sheep will not spin well; the poor hairs will not take the dye, and the manufactured cloth does not give satisfactory wear.

Each fibre or hair of wool is like a plant rooted to the skin, drawing its sustenance from the body of the animal, which fills the same purpose as does soil to an agricultural plant. Nourishment is manifestly necessary for the sheep if the wool is to receive its proper supply of fibre-growing food to maintain its strength, quality, and value for manufacturing purposes. Sheep, unless they are being fattened, want just food enough, resembling in this respect a successful crop, which requires neither too much nor too little manures or foods of the proper kinds. In purely pastoral grazing good and bad seasons follow one another often, and it requires skill to make the best of the pastures, but where fodders and roots are grown there is better chance of seeing that the fleece, along with the mutton, does not suffer from uneven growth.

Yolk is an important feature of wool. It is an oily, soapy, or lubricating substance, furnished, in quantity according to the good or bad treatment extended to the sheep, to the skin glands, and as it accumulates and exudes from the skin it incorporates itself with the wool fibres. Were it not for yolk the wool fibres would mat, would lose their pliancy and softness, would wear by friction, and become brittle. Without it wool would resemble more a poor, thin hair. Yolk also gives lustre to the wool, and its oiliness protects the sheep from injurious entry of rain to its body, and also protects the wool from the entry of foreign matter. Lack of feed is

followed by lack of yolk and lack of lustre in wool, although overfeeding produces an over-supply of yolk. Abundant feeding is for mutton production; good wool, health and constitution are better for feeding enough. Where there is exposure to much rain the function of yolk is diverted by being washed out of the fleece or into a pasty mass which clots, stains, reduces lustre, and depreciates the value of the fleece. While this is happening the general condition, including the mutton qualities of the animal, suffers, and it directs attention to the need there is for some description of shelter from frequent storms. Longwool sheep are more prone to matting of the wool, and the maintenance of lustre is an important factor in long wool; it is a manufacturer's requirement, just as he looks for crimp and serrations in short felting wool. The close, shield-like protection from the ingress of wet of the short, dense-woolled breeds makes them less disposed to matting of fleece. There is a cousinship between the best mutton parts of a sheep and good wool and yolk; where the best mutton is on the sheep there is found the best wool and the largest quantity of yolk. Deficiency of yolk in wool may be noted by the want of softness and pliancy in the touch and lack of brilliance in the lustre.

Wool is used for the manufacture of clothing, termed carding, and the manufacture of worsteds, termed combing. Wool that is short, crimped and well serrated is invariably preferred for the carding or cloth making, the longer sorts of over two or three inches invariably for the worsted or combing. Shortly, the carding process takes the shape of breaking and dividing the wool fibres into many pieces, and intermixing them prior to consolidating them by pressure into a felted mass of cloth. The serrations or scales on the wool fibre, which are so numerous on the shorter wools, aid largely towards this felting, for they interlock one into another. In worsted making the process is one of combing, laying

parallel, and stretching out the fibres and then spinning. The serrations in the wool do not count as of use for this purpose. Whichever purpose the wool is put to the sheep should be well bred and fed so as to ensure such qualities as strength, evenness, crimp, elasticity. Proper selection and breeding and proper feeding accomplish all this. Wool buyers are highly skilled in the technical requirements of the trade, and every attention devoted to a flock readily and competitively receives its reward at their hands.

After the Merino for density of wool comes the Downs, and the longwools are the least dense. The Lincoln has the coarsest and longest wool among the breeds known in Australasia. Its great length is what gives it its heavy weight of fleece. Warm climates in their ultimate effect tend to decrease the density of a sheep's fleece, making the fibre coarser. The change is slow in acclimatised sheep, and appears marked only after a few generations of the breed have passed. It is a naturally expected law, for density of covering towards animal warmth may be looked for in cold, and thinness of covering in warm climates; although it will be understood that a breed of sheep noted for its wool qualities for maybe hundreds of years will take a long time to radically change its coat in a changed climate, particularly if the change is not a marked one. Selection of stock influences density of fleece, feeding not much, although feeding influences soundness, pliancy, and softness, and evenness somewhat. Dense wool is more elastic; there is more rebound to the touch by reason of finer fibres of a greater confined waviness or crimp and serrations. All these qualities tend towards elasticity as against the limpness of coarser and more hair-like wool. Density obviously makes for protection of the animal, hence the power of withstanding storms that the Merino has over the longwool, and over the Southdown and Shropshire to a lesser extent.

Heavy land will give a coarse wool, and the coarse-woolled, heavy-carcassed breeds are more adapted to such land than the lighter breeds, whose quarters are more properly the light and sandy soils. The Merino grows splendid wool on what seems, and actually would be, a sparse or starvation diet for a longwool, but which is the ideally suited diet for the active, hardy, Merino breed, accustomed to patchy nibbling over a wide range.

The fine-woolled breeds grow the softest and most pliant wool, but the condition of the sheep, the quality of the soil, and the state of the yolk have an influence upon softness. Poor treatment will obviously lessen softness and pliancy; the wool grows thin and scraggy and lifeless. Poorer the treatment more nearly to death does the sheep get, and more nearly lifeless and poor is the wool. A feast to-day and a starve to-morrow will cause breaks in the wool fibre, to which the manufacturer objects by paying a lower price. Although there are modifications in such considerations, there is an association between clay soil and soft, lustrous wool. A limestone soil, which, however, is a favourable sheep soil in other respects, will tend to a certain dryness or harshness in wool. The herbage of a clay soil is mellower and softer, and wool responds sympathetically to its influence. What may not be of advantage for one thing, however, may be very good for others, for sheep obtain health on limestone country, and bone and mutton grow well.

Each breed has its own characteristic length of wool, and length is not so momentous at any time as quality. A poorly-bred sheep will have its breed's characteristic length of wool, but it will be of inferior quality. Food exerts a greater influence on the soundness of the fibre than on its length. As a sheep gets older each year shows a decrease in the length and weight of its fleece.

Good wool, it has been seen, is the result of good husbanding of sheep in domesticated or civilised sur-

roundings. It is the outcome of culture and attention. Prime, rugged health or fitness would be found in a wild sheep, but accompanied with hairy tendencies of wool that would be of small marketable value, and accompanied also by a slow growth of mutton. To raise good wool it is necessary to breed good sheep, and to attend to their wants. Unless the benefits of selection and care are exercised it is not possible to obtain satisfactory results. Inattention means reduced calibre of the wool fibre. It means more, for it means less mutton, less lambs, less constitution, less land value for the purpose of sheep farming.

The following technical trade terms, with their explanation, are of more than theoretical interest to the sheep farmer as bearing upon the practices followed by him in growing his clip:—

Clothing Wool—A Merino wool of short length.

Combing Wool—The longer Merino sort, and the longwool and crossbred.

Condition—Heavy - conditioned wool has a large quantity of yolk and other matter adhering to the fleece; light-conditioned is freer of these and is bright.

Cotted Wool—Bad treatment and undue exposure to rain will mat or felt the wool on the sheep's back. Crossbreds and longwools more liable than Merino, whose fine and dense wool acts as a protective shield.

Mushy Wool—Shows no pronounced staple; from badly bred or old sheep.

Quality—Refers to fineness or coarseness.

Shaftiness—A wool with a pronounced staple.

50's, 60's, &c.—Represents the number of hanks of yarn of 560 yards long each, that 1lb. of scoured wool will spin. The terms "60's to 90's" would embrace ordinary to superfine Merino, good half-bred would be "50's to 56's" quality, quarter-bred "56's to 58's," three-quarter on longwool side "46's to 48's," ordinary crossbred about "40's." A Lincoln's wool would be "36's to 40's."

Slipe Wool—Wool that is taken from the skins of sheep; not shorn wool.

Stained Wool—As done by the sheep's excretions.

Staple—Wool grows in clumps or bunches, and one of these bunches is a staple.

Tender Wool—Wool that will not resist reasonable strain without breaking.

CHAPTER XXXII.

SHEEP LAND VALUES.

Land values have so increased of late years as to create special demand for skilful management to make the working of a property a success. The layman is apt to overlook some important factors contributing to the increase of land values. It should be realised that the inverse influence of the higher cost of living, of labour, and of all appliances required for the farm, has, to a great extent, appraised values higher, the growing scarcity of country available for settlement helping. As a given sum of money will now purchase less labour, machinery, stores, etc., likewise must that sum purchase a smaller area of land.

At best it is but an empirical business setting values on sheep country. There are no two properties alike, and values are based primarily upon the carrying capacity, and the carrying capacity leans upon methods of management, particularly where English-sown grasses and crop cultivation are involved. This turns the question more into a kind of personal consideration of the adaptability of the individual. While a man of indifferent experience may make only 5% interest on outlying capital the skilful sheepman may make 25%. This in itself indirectly appreciates or depreciates the value of land to an important extent. When land is talked about as being worth so much an acre it must always be in more or less indefinite terms, and those only who can regard the matter with any fixity are the ones who are experienced in the methods of dealing with such lands. While A with his skill and experience can easily see his way to give £20 an acre for land, the best thing that B can perhaps do before giving such a price for similar country is to compare his experience and know-

ledge with that of A, and thereby decide whether or not he is adapted for the particular venture. He may find that, expressed in money terms, it may mean a difference in value of £5 or £10 an acre. It may be set forth, therefore, that one man may make a splendid living out of land that another has failed on, and it may be observed, broadly speaking, that a leading influence definitely operating towards the increase in land values is individual skilfulness, and towards the stagnation of values individual lack of knowledge. Successful effort is what counts.

Irrespective of the personal equation, however, land that has often changed hands at certain prices gets regarded as being of that standard value by the producing and business community, and there is something to be learnt in the tendencies of land value of recent years. The value of good sheep land has risen very much as compared to a dozen or fifteen years ago; quite naturally, too, for the products of such land have gone up in price.

Conditions throughout the Dominion, with its many latitudes, varieties of climate and soil, and nature of access, make it not easy to quote a standard price for sheep country, but it seems as if in most parts a cross-bred ewe is made to carry a responsibility of £6 up to £10 capital expenditure. It may be difficult to get in any part of New Zealand really reliable two-ewe-to-the-acre country, purely pasture, favourably situated, for less than £15 an acre. There is therefore the capital expenditure of £15 per acre for the land and £2 for the ewes, total £17, which the farmer will look to provide an annual return of, say, 12/- to 15/- for wool, and, say, 20/- to 30/- for lambs. This is a gross return, striking a mean, of 38/6, or 11% on capital, from which has to come management, upkeep and living expenses. In quoting figures the writer wishes to state that it is done suggestively. Figures are but statistics, it is well

directed effort that counts in the success of anything. Many sheep farms in the Canterbury Province have changed hands at as high a price as £10 an acre for one-ewe capacity, and where the labour of turnip-growing is involved. It is a high price, based upon a 100 per cent. lambing, which is usual. After all expenses are provided nothing much is visible by way of return to the owner. If wool, and lamb, fattened on cultivated feed, make, say, 25/-, from which comes 10/- interest on outlying capital, there is as a set-off in this class of sheep farming heavy expenses for cropping, labour, upkeep, which quickly dissolve the bulk of the 15/-. Relatively £10 an acre for one-ewe country is the equivalent of a full £25 an acre for two-ewe country, and this sounds more like a dairying price.

Speaking generally, and taking the Dominion as a whole, it may be said that prices ruling for sheep country, where the chief or sole reliance is placed upon pasture, and where an experienced man may hope to engage himself in a profitable occupation, are, except where access is bad, £4 an acre for one-sheep country, £5 or £6 for one-ewe country, £8 or £9 for one and a-half ewe country, and £13 to £15 for two-ewe country, and in some parts £18 to £20 for two and a-half ewe country of fallen bush land not yet ploughable, and where lambs are sold as stores for about 10/-, with lambing of 100 per cent. and over. Where the country is really suitable, and access and locality reasonably favourable, such prices are paid by experienced men. The sheep farm that has a good proportion of cultivable land fetches considerably more, but then the mixed farming capabilities of such and prospective use for dairying enter into consideration, and it may be said to be more or less speculatively held as a sheep farm, ultimately destined for dairying.

The foregoing prices are for sheep farms of a general average area of up to a thousand or two acres. The

larger estates of the better kinds of land are fast disappearing in subdivision. It can hardly be said, under existing methods of sheep farming and without the aid of root and fodder crops, that there is much scope for increased production from sheep in New Zealand. With the development of easy communication to the back country, it is much more likely that in such a well-watered country, with estate subdivision so active, dairying and cattle raising will, to a considerable extent, displace sheep. The prevailing price of land supports this theory, for the returns from sheep can barely warrant the figures given for many properties. To be sure there is room for improvement of sheep flocks which will result in additional wool and mutton output. This will come about gradually as the new type of farmer, evolved in the altered subdividing conditions of New Zealand sheep farming, gains greater experience in sheep management, but while it is coming about dairying will be extending its influence, and instead of land values remaining at what may for sheep farming be regarded as a maximum, they will in many cases probably advance. Although sheep country has gone to a big figure, there is with most farms a great scope for further improvement of the land by way of fencing, shelter provision, and more skilful grazing and feeding arrangements. By more skilful methods and improved labour conditions the flocks of the Dominion should, however, increase a full 50 per cent., providing no encroachment of dairying occurred.

Generally, it may be said that the farmers of New Zealand, in their consideration of land values, make no allowance for their own labour. The same has been remarked of the farmers of the United States, and it applies equally to the farmers of other countries, no doubt. They base their prospective profits upon figures of expenditure that allow nothing for their own or their families' efforts. This may be well on a rising market

for land values. Taking such a view of things has, however, in the past meant that, while many bought properties and sold out exceedingly well, it is doubtful, if they had prospectively debited their own labour, whether they would have become purchasers at all. The independence of the life seems to be regarded as a valuable asset, which one's own efforts are not allowed to stand against as a liability.

CHAPTER XXXIII.

CAPITAL REQUIRED.

To buy a large pastoral run requires a lot of capital; to buy some of the small grazing runs of the Dominion also takes a deal of money, but as this chapter is written primarily for the average sheepman, an estimate of capital required by such is quoted. Knowledge of the art of sheep husbandry is often as good as half capital, and the man who is acquainted with the business can safely work upon much less capital than the inexperienced person, whose income may be much lessened by faulty methods or by cost of employing capable management. The man with knowledge, but small capital, can much more confidently arrange finance and leave on mortgage a large percentage of the purchase money.

Let an example be taken of what capital expenditure would be involved in the undertaking of a sheep farm running, say, 1,000 ewes. It is doubtful if anywhere in New Zealand reliable two-ewe country can be obtained reasonably accessible to market for less than £15 per acre. Therefore:—

500 acres at £15	£7,500
1,000 good breeding ewes at £1	1,000
20 rams at £5	100
Extras—Implements, etc., say	250
Total	£8,850

According to this each ewe carries a responsibility of close upon £9 capital expenditure, and the fact forcibly illustrates the call that there is for skilful management. There is no doubt that with the farm of the proper class the proper man could do a lot to make ends well meet in this case. To earn a gross return of 10 per cent. on this capital the 1,000 ewes would require to return £885 per annum, or some 17/6 per ewe, from

which, of course, has to come expenses of management, upkeep of flock, etc. For the year 1914 the average return per head of sheep for New Zealand flocks came to 13/-, inclusive of all classes of sheep and all classes of country. But the type of country under review is specially adapted for sheep, and presumed to be reasonably near to market. A good ewe will cut, say 6/- or 7/6 worth of wool, and give a lamb worth, say, 10/- to 15/-. Everything depends upon skill in management, and in some instances lambs are turned off good grass or specially-grown feed at higher prices. Some fortunately situated and capable New Zealand sheep farmers will get a gross return of 25/- to 30/- per ewe per year, but they have suitable and good country, close to market, and naturally such land is worth more than the fair average good land under review.

It is also possible for a man to buy a place suitable for sheep of lesser value and capable of great improvement by ploughing, subdivision, fencing, shelter provision, and hope to make a good thing out of it. Say :—

500 acres at £6	£3,000
500 ewes at £1	500
Extras	250
Total	£3,750

This man may by fodder and root crop growing, increase his carrying capacity to two ewes to the acre. The flock of 1,000 ewes would then return at 17/6 each an income of £875, representing a gross income of 11 per cent. on a capital of £8,000. He has more than doubled the earning value of his property. Certainly he is carrying on at a greater expense than the purely pastoral man, but, nevertheless, he has made a property that may ultimately be laid down in good pasture.

There are good opportunities offering to the intending sheep farmer with small capital, if he is prepared to put some energy into the occupation, in buying second-class country unimproved, which may be covered with ti-tree, manuka, fern, etc. There is a lot of such

land available, and often of very fair quality. Providing he satisfies himself there is some potentiality about the soil, and that the plough can be got at part of it, the prospect lies before him of turning it into a productive place by fencing, ploughing, crop growing. Such land is obtainable cheap, and a lot of money is yet to be made out of improving it to satisfactory sheep land. Perhaps figures of suggestion may again be quoted as to what can be done with such country. Say, 1,000 acres fern or ti-tree land, with part ploughable, capable of carrying at present a handful of sheep in an indifferent manner, it could with proper treatment be made to carry possibly 1,200 to 1,500 ewes. It might be considered dear unimproved at £3 per acre, but if made to carry 1,200 ewes it should be worth £7 per acre.

Then there is the man who can go on to a bush section with very little capital, and, gaining experience as he gradually improves his property, has the satisfaction of seeing his interests become more and more valuable as the results of his efforts and improving prices of stock.

CHAPTER XXXIV.

THE GRASSES FAVOURED BY SHEEP.

The sheep was originally, indeed is now largely, a hill or mountain living animal. At no time probably in its natural state did it resort much to the lowlands. The ever present danger from enemies, such as wolves and wild dogs, made of them by compulsion if not by choice, high land frequenters. Judging from its timorous disposition it must have been one of the most hunted of animals. Its utter helplessness and simplicity suggest it as being an easy prey to organised bands of carnivorous and cunning wild animals. Possibly the only time it showed up on the low, open country was when driven in search of food, when an incommensurate increase in their numbers depleted the grazings of their usually safe grounds. Undue increase in numbers was a common enough fate of the human family before the better economy of modern civilisation became established; how much commoner it must have been in the animal world. Sheep show marked characteristics proving that they must have been hard hunted through countless ages, and their facility for segregating together when danger pends indicates deficient wariness that would give packs of wolves or dogs favourable opportunities for successful hunts. When sheep are cornered they follow the lead of any header in breaking away, and going with notable aimlessness, as they have so often done, tumbling one after another over a precipice or some such unreasonable place.

Through lacking originally in quickness of foot and intelligence, everything points to the sheep having been compelled to continue as a mountain-living animal, and the habits acquired by camping there for many ages

naturally gave it a predilection for the short and sweet grasses that are the earth's covering of the hills. The great territorial flats of Australia are, in many respects, the equivalent of the hill conditions of other countries. The rainfall is small, the growth of grass therefore fine, and the food sparse enough to compel ranging for a meal. The heavier breeds, the result of artificial conditions, will thrive on the richer and ranker grasses of suitable flat land, but the preference of the average sheep is for the finer-bodied, sweeter, grasses of the hills.

The robustness and coarseness of the grass plants of flat land are measured by the quality of the soil. Rich land and a good rainfall will grow much feed of such a nature, making the grazing of it more adapted for cattle. It is such land that gives us grasses that grow a big leaf; they have lived for ages on good soil, inducing a heavy growth. Ryegrass, meadow foxtail, timothy, all are at home on such land, and the large breeds of sheep have lived so long on such pastures that they have become large of carcass. Good, flat land, and large-leaved, bulkily grown grasses, and large carcassed sheep go together. Similarly, the finer and smaller-leaved grasses have acquired their fineness of growth through having grown for ages on the meagre meal of what is termed second-class soil, the natural home of the sheep. The hard fescues, poa pratensis, and crested dogstail grow well on and are suited to medium lands, where the Downs breeds of sheep thrive, and these sheep inherit a partiality for such grasses.

When the question of skill in sowing grasses to establish themselves permanently is considered, we are met with the logic of the fact that the grasses of the good, flat, heavy lands, such as rye, timothy, foxtail, although they may do moderately well on the hills for some time, with manure or the ash of burnt vegetation, cannot be expected to compete with the grass plants

whose habits are native to such second-class land. Assuming that there were no second-rate land grasses, and that the better grasses had the undisputed field to themselves, it would be seen that some of them only would permanently establish themselves on the hills, but they would degenerate in size and in economic value, and become really less valuable than the grasses at present adapted to such land by reason of their long lodging there. It may easily be understood, therefore, why such grasses as sheep's fescue, hard fescue, crested dog-tail, etc., are spoken of in association with sheep pastures, for they are the natives of the haunts of sheep. Sowing these grasses on rich flat land essentially adapted to cattle grazing would obviously be economic waste. They would not provide the bulk of feed for large-hoofed stock, although they would produce more than what they would do on the hills. And sowing the heavier or better grasses on hill lands would likewise fulfil no serviceable purpose, for not only would it mean a smaller bulk of feed, but the ultimate decay of many would transpire, besides a dispossession by other grasses already better suited to such land.

Grasses behave differently in different soils. Take a case in point, an extreme and very illustrative one. Tall fescue, by its strong growth on the good lowlands of the North Island, makes of itself a perfect nuisance, fit neither for cattle nor sheep consumption, but on some hill soils of the South Island, or any hill soils for that matter, it may be seen growing not nearly so coarsely, and grazed well by all stock. It is doubtful if it will last on these hills, and if it does it will be due to its being an inherently very healthy and resourceful plant, and, at any rate, in the course of time will become more and more like the ordinary sheep fescues of such country. Then, again, other grasses, such as timothy and foptail, growing on good lowland and in bulky fashion more suited to cattle grazing, may on

dampish hill country exist for some years, and their growth of herbage be so modified as to suit the pasturing of mountain sheep well. Their permanency would obviously in the natural order of things be always doubtful; the local resident grass would oust them where natural decline through lack of accustomed soil diet would not do it, questioning the wisdom of their ever having been sown out of their element. The term hills, in these remarks, should not be confused with uplands, for flat lands in hilly country will often carry permanently the best of grasses.

Cocksfoot is, in New Zealand, a wonderfully resourceful grass, and grows and apparently holds permanently on most kinds of land of any quality, barring poor, dry hills, or where the soil is of insufficient rooting depth. Its bulk of growth is, however, less on the poorer lands, but wherever it holds it is preferred by the farmer to some other grasses quite native to such soils, and which might give a greater total annual bulk of growth. On inferior, dry hill and mountain country the native danthonia thrives, and where it is the dominating grass the suggestion is for a light breed of sheep, accustomed to hills and accustomed by long inheritance to the poorer feed of the poorer kinds of country; a wool type of sheep, in fact.

In a general consideration of the respective stock uses of grasses, a distinct line of demarcation may be drawn between the heavy-growing grasses of lowlands, suited for the grazing of cattle, and to a minor degree, the heavy breeds of sheep, and the finer grass plants, whose natural abode is the hills, and which are essentially adapted for the grazing of the lighter mountain breeds of sheep, whose sound health will always be a leading factor in the economy of sheep breeding.

CHAPTER XXXV.

COCKSFOOT.

If one were asked to state to what, more than anything else, may be attributed the wealth and prosperity of New Zealand, the answer would be, to cocksfoot grass. The pastures of the country provide principally the material composing over three parts of the Dominion's exports, and these pastures are constituted in the main of cocksfoot. In all the provinces, in every nook and corner, at every latitude and every altitude, from sea level to 3000ft. up, the plant may be seen flourishing; fine specimens often on steep, if not abrupt, land. It is difficult to realise that any grass plant could be so generally adapted to the all-round conditions of any country as cocksfoot is to New Zealand. It is eminently responsive to the country's liberal rainfall and sunshine, and when an occasional drought makes a call it responds on most soils. Many pastures of the Dominion are composed almost entirely of cocksfoot with clover.

The sowing of cocksfoot as the leading grass in New Zealand is a good principle in establishing a pasture, but it is no argument for sowing it to a very predominant extent on some soils. Where it is prominent in a pasture the grazier has to contend with its extraordinarily robust growth in the spring or early summer time, when it is at its best, completely overtaking the consumption of the stock, and where sheep are the leading stock this throws one's grazing arrangements out of gear. A profusion of feed is made available suddenly, and two features become prominent—waste by trampling, and the grass running to seed and becoming fibrous and unsuitable for sheep. This suggests the question if it would not be better to have in the pasture a larger proportion of other grasses

that would, by a better winter growth than has cocksfoot, give a more balanced supply throughout the year, which is perhaps the first consideration in the constitution of a pasture. For soils that are anyways good, and not too dry, two grasses immediately suggest themselves for the purpose—meadow foxtail and timothy. The first is a much superior winter grower to cocksfoot, resembling it in appearance. It is not sown to anything like the extent it should be on suitable New Zealand soils. It is also the very first standard grass to come away in the spring, and a grazier knows the value of this quality. Timothy luxuriates as the summer is well advanced, and is also a good winter grower. Where the land is suitable these two grasses will hold their own, and provide the necessary inversion of cocksfoot's usefulness.

But all lands are not adapted to meadow foxtail and timothy, and the drier soils where cocksfoot is in possession enter into consideration. Meadow foxtail and timothy are quite unsuited to dry, hilly country. Where sheep grazing is the primary object, as it is on such country, there are other plants that deserve consideration, and will help to equalise the pasture's usefulness. Hard or Chewing's fescue, crested dogstail, and poa pratensis, or the Kentucky blue grass, as it is otherwise known. Opinions are extraordinarily divided about the first-named grass in New Zealand. Very little of it is sown in Canterbury, and not very much in the North Island. In the provinces of Southland, Otago, Marlborough, and Nelson, however, it is regarded with great favour by old, experienced and observant pastoralists, who maintain that no sheep pasture should be without it. It seems as if there can be no more certainty about grasses than about breeds of sheep for any particular soil and climate, and practical experience is in the main what dictates the best. Sheep are very fond of Chewing's fescue in the provinces named, and it is known to grow in the winter, when cocksfoot and other grasses lie dor-

mant. In a pasture composed equally of cocksfoot and Chewing's the sheep will prefer the cocksfoot during the spring growth, leaving the Chewing's, which runs to seed in a fibrous stalk. It is therefore necessary to sow only a small quantity of Chewing's. The dogstail is a wiry-stalk seeder, but has proved itself to be a first-rate dry hill grass, for it resists the effects of drought, and sheep are always partial to it. *Poa pratensis* suits most New Zealand hill land, and sheep are everywhere fond of it. These grasses might well be used more generally in New Zealand on such country, so as to reduce the quantity of cocksfoot, and to provide a bite when cocksfoot slackens off from its rushing growth, and when it lies quiescent in the winter. With these grasses for the poorer lands, and foxtail and timothy for the better, the economic usefulness of the area under pasture should be materially enlarged.

It is a mistake for the average grazier, or indeed any grazier, unless he is experimenting on well-defined lines, to burden himself with the consideration of too many kinds of grasses, so few of which receive attention in ordinary commercial farming operations. The unmistakable all-round usefulness of cocksfoot removes this largely from him in New Zealand. He should, however, know something about the main standard varieties; and it is surprising how few are the sorts used in practice in New Zealand, or indeed in any country. When the rye grasses and cocksfoot are mentioned, and hard fescue, dogstail, timothy, *poa pratensis*, and meadow foxtail to a lesser extent, with the clovers, one quotes all the grasses used to any great extent in New Zealand, and about all that are necessary to use on the average grazing property. In certain exceptional localities, of course, other grasses are used to meet special conditions. Brown and red top are sown on the dry parts of the Auckland Province. They are practically the same grass as florin, which, under normal conditions, is eschewed. And the

danthonia or native grass is sown on fern country, so that its fire-resisting power will enable frequent burns to be made towards fern eradication. Prairie grass is a magnificent winter grower in any part of New Zealand, but will not withstand ordinary stocking. It is, albeit, surprising that more New Zealand graziers cannot report success in dealing with this valuable plant on lines something like the following: Sown in a paddock entirely by itself, it could at all times be carefully stocked, removing the animals before they get at the heart of it, and allowing the paddock to run to seed every second or third year. It is a most valuable winter grass, and there would not be much loss incurred in allowing the paddock to seed, for when doing so the paddocks of the other grasses would be in good spring and summer growth. The growth of prairie when every other grass is in repose is truly wonderful.

Cocksfoot is indeed the sheet anchor of the New Zealand grazier, and to establish a satisfactory pasture he need not concern himself with the names of many other grasses to go along with it. If the grazing is meant for cattle there might be more foxtail, perennial rye, and timothy on good land, with cowgrass included, than is generally used, and if for sheep, hard or Chewing's fescue should be added. A grazier may be able to make up his grass seed mixture from the following kinds and quantities used in conjunction with cocksfoot and the rye grasses:—

	Sheep land. Per Acre.	Cattle Land. Per Acre.
Meadow foxtail	2 lb.	5 lb.
Hard of Chewing's fescue	1½ lb.	0½ lb.
Timothy	1½ lb.	3 lb.
Crested dogstail	1½ lb.	—
White clover	2 lb.	2 lb.
Cowgrass	—	2 lb.

Where the land is not damp enough for foxtail and timothy they may be left out, and Kentucky blue grass given a trial, but not where the land is to be ploughed.

Too much observance cannot be taken of the fact that in a pasture of mixed grasses the better relished sorts are seldom allowed to evidence themselves, so closely do stock graze them. These are the grasses that sustain the good carrying capacity of the land, whatever it may be. For example, in one paddock under notice, where timothy and foxtail were sown liberally, the stock never allowed a plant to run to seed, but in a fenced-off part, which they could not reach, the plants leafed and seeded luxuriantly. It should not be difficult for any grazier to allot a small area of ground for such observations, and it would certainly be the means of adding very much to his knowledge of grasses and the land, and give him the superior practical acquaintance that seems so essential in the consideration of grasses, more so than on any other subject appertaining to farming in pastoral Australasia. While soils and climate vary, it is not feasible to expect that the subject of grassing can in any ways be reduced theoretically to a defined theme.

CHAPTER XXXVI.

HILL PASTURE IMPROVEMENT.

A great part of the hill country of New Zealand under pasture is devoted almost exclusively to the grazing of sheep. In its original state such land presented three different aspects—that under bush, that under scrub, and that which was open and bore a covering of native grasses and tussock. The fallen bush lands and some of the scrub lands have been surface sown in English grasses, and the prevalent complaint now is that the carrying capacity of them has receded from what it had originally been, much in some cases, considerably in others.

That failure to graze cattle in conjunction with sheep has a lot to do with the decreased carrying ability of hill land that had been fairly suitably grassed, the writer is inclined to think there is but little doubt. Of course, if grasses quite unsuited to those hills were originally sown it is natural to expect retrogression under any circumstances.

A note which comes from Scotland with respect to its sheep-grazed hill land is but an endorsement of what is the cause of the decrease in carrying capacity of the New Zealand hill pastures. An English Board of Agriculture publication on the subject declares that it was found that many hill grazings in Scotland date their degeneracy from the clearance of Highland cattle to make way solely for sheep, and adds that it is not too much to say that proper grazing of all pastures, whether hill or lowland, is at least as important as manure. Constant grazing with sheep alone, the publication con-

tinues, will ultimately spoil almost any pastures, except those on soils composed of chalk or mountain limestone, which naturally grow little but close, fine herbage.

It would be a big gain to New Zealand if deterioration of hill pastures, where it occurs, could be stayed, for it is the hill pastures which provide the great bulk of the sheep exports of the Dominion. It is too costly to top-dress more than but an infinitesimal part of these lands, and at any rate it is questionable if in many cases it would not be money wasted, unless accompanied by proper grazing methods.

It is observed with respect to the land under consideration that grass plants which to all appearance had been firmly established in the soil, sooner or later begin to exhibit signs of decay. Sheep return to the land not much less than they take away from it, but in spite of this the plants quite obviously lose some attribute attending their previous virile growth. There seems to be cause for believing that the influence of the weather has, fundamentally, a great deal to do with it. It is recognised that the frosts of winter have a particular tendency to raise or displace grasses and loosen the soil. The expanding power of frost is well known. Frosts will lay the soil open to weather influence; the sun will bake the soil, causing fissures, and rain following will deplete it of its richer constituents in the shape of detritus and decayed vegetable matter and animal manure, which become soluble and prematurely descend into the ground out of the reach of the roots of many grass plants, or out of the ground into the waterways. Little more than the coarser sands of no retentive capacity is left behind to form the feeding intermediary of the plants. The manure and other matter deposited or decayed upon the ground is hastened away by rains without getting an opportunity of fulfilling any conservative purpose.

After the soil is loosened by the action of frosts, it seems as if the tread of sheep is insufficient to compact it again, and the heavy hoof of the cattle beast rightly suggests itself. The important service of cattle in this respect is supplemented by their use for grazing down the coarser pasture growth ignored by sheep. Many New Zealand graziers who have pastured some cattle along with their sheep have noted the great benefit it wrought to the land. Not necessarily simultaneous sheep and cattle grazing, but in regular rotation throughout the year, making the best of the feed. The observations that come from Scotland regarding its hill pastures are indorsement of this policy. They are those of older and more permanently established pastoralists, who had a better chance of making the necessarily extended comparisons; and the conditions in that country are equally applicable to New Zealand, for the behaviour of hill pastures anywhere must vary but little.

The circumstances surrounding the question of hill pasture deterioration are such as to lead one to think that exceptionally valuable benefit would be derived from the running of a mob of cattle on paddock after paddock of this kind of country, so as to compact the frost-raised soil before the rains wash away the valuable detritus, manure and decayed matter. All hilly country, on account of its greater exposure to frosts, to sun, and baking winds is liable to loss in this way by escape of such pasture foods from off its surface. If, by aid of suitable grazing this is avoided, the decay of vegetable matter, utility of animal manure properly detained in the ground, and the beneficial influences of air, sun, and frost, will carry out their parts well, and continue to maintain the land's carrying capacity, if not really to improve it.

It must be conceded that a pasture, whether eminently or only moderately adapted for sheep grazing, will, under the grazing of sheep alone, not receive the same

economy of treatment as where the grazing of other stock accompanies it. Sheep are, under wide-ranged grazing, notorious pickers and choosers; they will eat almost anything when forced to, but their condition and profitableness suffer, and there is a happy medium. Most pastures contain grasses that they may not be partial to. It may be a grass that they are not inherently attached to, or it may be a grass that, influenced by the constituents of the particular soil, does not make itself palatable to them. It is ignored by them, grows lustily, and reproduces itself. In good growing seasons, when the property is necessarily understocked, such grasses are left alone, and thrive at the cost of the welfare of the preferred plants. A lot of valuable cattle feed is here wasted, while the carrying capacity tends to recede. All this provides additional reason for cattle-cum-sheep grazing, if the best is to be made of pastures, which surely with the bright pastoral outlook, will cause all stock grazing country to become more and more valuable, and deserving therefore of the fullest economic treatment. Indeed, it may be said, with obvious paradox, that under the steadily increasing land values, country that has receded in carrying capacity, has nevertheless become more valuable. But, how much more valuable would it be were there no receding of carrying capacity?

CHAPTER XXXVII.

THE GRAZING OF A PADDOCK.

A paddock that is composed of English grasses implies considerable stock-carrying power, and it is therefore inadvisable to graze sheep in it for too long a time continuously. Perennial grazing of such a pasture with a fairly full complement of sheep means vitiation of the herbage, and this is followed by reduced condition and health of the stock. If continuous light stocking is pursued, on the other hand, it will mean less pasture poisoning by excreta, but it is a wasteful plan, for the feed outstrips consumption, and what is not trampled and soiled grows fibrous and unsuited to sheep. Moreover, during a long-continued wet time the damp-retaining grass will not help to ward off footrot. It may, therefore, be conceded that short heavy stocking so that all feed may be consumed quickly and without waste is the plan. Several paddocks have to be available for the stock to enable this to be done, and better the land is the more fencing it can profitably stand.

The exact time when the stock, under such a scheme of change grazing, should be removed from one paddock to another is important, and is best left to the judgment of the grazier, who knows what feed there is ahead in the other paddocks; but care may be taken to see that the grazing is not done too close, particularly when the weather is cold and inclement. This may be easier said than practised, but collateral root and fodder feed provision, which should be undertaken wherever English grass sheep grazing is followed, or well-planned grazing arrangements will see the rule through. If grass is grazed too close in cold weather the plant's crown becomes exposed, growth is arrested and vitality injured

much more than a cursory observation will show, or the temporary profit on the feeding stock recompense for. Nothing in nature—man, animal, plant—cares for naked exposure to the cold. They all seek shelter, and flowers, buds, leaves, contract or close-up in cold and expand and grow in warm weather. The grasses of the open field, in communistic fashion, provide shelter one to the other, and the leaves of each shelter its central or seed growth. When the field is stripped bare and close in cold, or indeed in hot weather—for shelter is required from heat as well as from cold—it is obviously against the interest of the grasses, and their bulk of season's growth is much delayed and reduced. And every time it is done it causes the decay of some plants.

The light stocking of a paddock of English grasses to enable continuous running of stock on it, has an additional objection to those mentioned. The animals seek out the better grasses and feed them so attentively that, come dry or wet weather, they knock about and uproot many plants. A favourite grass may be, naturally or in a particular soil, a shallow rooter. The inferior grasses escape this over-attention. They would under heavy short stocking be included in the meal, and be eaten fresh and sweet, and not tackled after more or less vitiation as in an understocked paddock. The picking and choosing of the better grasses means that the absolutely inferior ones are left alone to shelter themselves and to seed, and are ready always to jump the claim of the better grasses that may be slowly but surely destroyed.

Every farmer may have a defined rule with respect to the size of his paddocks, in accordance with the nature of his farming operations, extent of his property, and quality of the land. If he is sheep farming on an extensive scale he cannot have a network of small paddocks, nor need he, for here invariably the land is not first-class, and may not warrant heavy fencing. Neverthe-

less he wants several paddocks, large as they may be, wherein to place his large flocks. But the small sheep farmer can rule, according to the shape of his farm, quality of land, shelter, water supply, etc., whether he should have an average paddock of 100, 50, or 25 acres. Some intensive sheep farmers go to the extent of paddocks under 10 acres for sheep alone, placing several hundred in one for a week or two at a stretch. Where the land is good the fence is a cheap means of increasing returns, but if the flock is a permanent breeding one, it must not be forgotten that scope for exercise is required. There is no sheep condition-maker and digestive-trouble-resister like fresh, clean, sweet grass, for it has been their accustomed and staple diet for countless ages, and resting a paddock will give it an opportunity to cleanse with rain and weather. Again may be noted the dominating influence of nature towards man, animal, insect, plant, even the busy bee, in demanding rest. But man is the most unfortunately ill-rested of the lot, and he tries hard to make the rest of nature, including his grass paddocks, as foolishly restless as himself.

When the pasture land is inferior there may often be a doubt as to how much it may be subdivided into smaller paddocks, but unless it carries but a fractional part of a sheep to the acre all the year round it should stand subdivision, and the payableness of subdivision should be easily figured out, for carrying power may often be increased 50 per cent. and more by sub-fencing. With several paddocks on a place, each one could be allowed to go to seed in turn if thought desirable, and at any rate the sheep's propensity for chasing after and living on the better plants at the good time of the year, and feeding on the inferior ones at the bad time, when they are most innutritious, is curbed.

CHAPTER XXXVIII.

THE ELEMENTS' INFLUENCE ON PASTURE GROWTH.

The sun or light, and rain and air, are the three essential agents in the growth of plant life. To be well-grown and healthy grasses require a balanced proportion of all these. Without the light or sun there would be no chemical transposition within the plants to saccharine and starch, and these provide the nutrient and fattening properties for the grazing stock. Without rain the plants' food supply in mineral and decomposed vegetable or manure matter in the soil would not go into solution to be absorbed by the hungering plant. Without air, the process of respiration,—and a plant is as living a thing as an animal—of absorbing and throwing-off carbonic acid gas and carbon by the respective functions of the plants would not be possible. Without all these things grass, indeed, would be a dead thing, would not have existed.

There are such things, we can readily understand, as a good or a bad supply of light, a good or a bad supply of rain, a good or a bad supply of air. A good supply of all of them, with the soil of the proper kind, is what gives us valuable agricultural and pastoral lands, and with all of them inferior we get land of low value. But it is possible for most of these great natural requirements to be good and but one of them deficient. This is eminently illustrated in the case of a country or locality with a deficient rainfall. Then again there may be too much rainfall, and the growth becomes not properly suitable for sheep to thrive on; the roots of the grasses have to put up with aquatic conditions and de-

ficient air supply; the feed therefore becomes defective in the sustaining or fattening properties which wholesome sun and air give.

It is not often that nature is disposed to lavish all the incidence of favourable elements upon the farmer, and the farmer has, therefore, to engage upon a contest with nature to take the most from it, as opportunity presents itself, to serve his own purposes. If he did not he would find himself, and all civilisation depending upon his efforts for their food, on a low plane in the plan of creation. He therefore sets about growing crops and conserving them for use at the time that nature, by cold and by lack of rains and sun, acts niggardly towards his pastures. In the struggle for life the common plants and animals exhibit great intelligence, if it may be so-called, and ingenuity, but man places himself on a higher plane, and to remain there he must exhibit industry and ingenuity. The basic principle of the successful growth of stock is even, sustained thrift; but in pastoral New Zealand and Australia it is noted that there are many more interruptions to this than in any of the icy-winter countries of Europe, where, at any rate, proper and complete provision, at great expense and labour, is made to carry stock over the bad times of the year. Stock starve or die through improper provision or forethought for their requirements, and the grazier who permits it cannot, if he reflects, take credit for great superiority of method in his farming operations. He should accept the chances freely and lavishly offered to him by nature in a climate like New Zealand, and grow and feed, or conserve for use in times of need, the many fodders and roots at command. By doing this he becomes a sheep farmer, not merely a sheep grazier.

CHAPTER XXXIX.

FERN LAND.

There is a more or less fair share of fern and bracken land right throughout New Zealand, very pronounced in some provinces. The high prices for all kinds of stock should help to remove doubts as to the payableness of displacing such growths with a valuable sole of grass. The rewards to be met with in improving this kind of country are : First, the direct benefit of better returns ; second, the enjoyment of rising stock and wool prices in a world-wide growing scarcity of such products ; third, the setting up of increased value to the land by virtue of the additional output from the farm helping to augment the country's prosperity and population.

In the past many settlers have concluded that fencing this class of country is such an expensive item—timber generally in the locality being unavailable—as not to warrant the erection and care of much and satisfactory fencing, and they therefore not only suffer from being the possessors of low-valued unimproved properties, but the consequences of costly mustering and shepherding and losses through the straying of stock. A good scheme of subdivisinal fencing and judicious stocking with cattle and sheep will in itself bring about ultimate fern eradication. A pastoral property, of fern country even, can never be regarded as worthy of much entertainment except it is skirted by a secure fence, and, indeed, reasonably subdivided.

Fern seldom grows on poor soil ; wherever it flourishes it is a sure indication that grasses will thrive there. Greater the fern growth better the prospects for substitution by grass.

There are several methods in vogue for the eradication of fern. Constant cutting will enfeeble the plants and starve the roots, but this process is, from an expense point of view, out of the question in dealing with large areas of such country. It might be applicable to small patches of good, flat land. Fencing the fern land into sections and crushing with cattle is not only a slow process, but the cattle will have an unenviable time of it dietically while performing their share of the work.

The cheapest and probably most effective method of procedure to the general conditions of this country is in burning the fern first, then fencing immediately and sowing down with a moderate quantity of grass seed with the object of getting the stock to move about amongst the fern and accomplish its eradication. The burning could be done at a seasonable opportunity, invariably the autumn, but a lot of fern country can be fired during the drying easterly spring winds. A suitable and cheap mixture for grassing would be, say, 10lb. cocksfoot, 2lb. Chewing's fescue, 1lb. crested dogstail, 1lb. Kentucky blue grass, and 1lb. white clover. Cocksfoot does very well under such conditions, its robust growth putting up a good fight with the fern. Chewing's is a willing taker at any time. Dogstail, when once established, will self-seed well, by reason of its seed-stalk being left alone by stock, and gradually spread itself. Kentucky blue grass, to be sown only where ploughing is not contemplated, should also do well under the conditions, and it is a most excellent hill grass. It and dogstail are well liked by sheep, and both of them contain many more seeds to a lb. than cocksfoot. The paddock need not be made a big one for a start, say, 40 or 50 acres. Indeed, large paddocks should be noticeable for their absence.

When the fronds of the young fern appear after the burning and grassing, a heavy stocking of strong, healthy sheep should be made. They should be kept on until they eat all the young shoots. If no rain falls

during their enclosure in the paddock, it is desirable that a heavy draft of sheep be placed there when a shower does fall. Their tramping will bury the seed in the soil and fern ash, and gives an excellent send-off to the pasture. Whenever a fresh shoot of young fern is observed the same process of heavily stocking with sheep should be pursued, or, when the grass growth attains a young and tender state, liable to destruction by sheep, cattle could be put on as substitutes. In fact, right through the process, it is better to use both cattle and sheep; what shoots one will leave the other will take. When the young fern shoots first make their appearance the sheep will eat them, but if the shoots are allowed to turn into leaf they will not tackle them. It is important, therefore, that careful observance be made for their appearance from time to time, and the paddock well stocked before they advance into leaf; otherwise, what should be a successful method of fern eradication will be spoilt by the fern lustily getting a hold again. Carried out properly it will be observed that each successive growth of fern shoots will become weaker and weaker, and the grass more evident. By a little attention to the paddock in its early stages one should in the course of a year or two have an area transformed from a state of practical worthlessness to one carrying stock well. Wherever the land is at all good—and where fern grows well, it is invariably good—a settler cannot go wrong in displacing fern by grass. It will add so substantially to the value of his property.

Where the country is at all adapted to the plough, however, eradication of fern by cultivation is often more efficacious. It at once transforms almost valueless land into crop-returning soil, subjected to eventuating improvement by the valuable and soil-enriching grazing of sheep. Even if the ultimate use it is put to is pasture it will be made most valuable country, with this fertilising and improving aid of sheep, suitable crop growing and

skilful selection of the best artificial manures and grasses.

The King Country method of breaking in fern country is well worth recording. It is claimed to be better than ploughing, for it does not stir up the soil, which being light as a rule, and having so much fern root, is difficult to compact again. Burn the fern first, then give, for preference, two cuts with the disc harrows; then run over with a chain harrow. Grass seed is then sown with manure. The burning is invariably done late in the summer, and the sowing in February. If sowing cannot be done by first week in March stock are kept on to eat down the young fern shoots, and the grass seed sown in September.

CHAPTER XL.

DISEASES.

There is considerable, if not great, trouble in doctoring sheep, much of which may be avoided, in a country so emiently adapted for sheep farming under healthy conditions as New Zealand, by a little forethought and attention. When anything is wrong with sheep it generally affects many of the flock, and for this reason it is always advisable to take pains to avoid conditions that may give rise to any complaints, which eat into profits by thriftlessness of flock, losses, and labour of doctoring. Shortly, prevention is better than cure, and the best object in studying diseases should be to know sufficient of the causes of them to enable precautions to be taken to prevent their appearance. Reasonable attention to two things, suitable surroundings and wholesome food—not fouled, overstocked pastures—prevents many ailments. The sheep is hardy so long as the breed is located in its true environment, and its condition maintained by proper food supply. With a knowledge of the general requirements of a flock throughout the year, and this is necessary to attain success and profit, much can be done to avoid the encroachment of disease. Thorough dipping frees the animal from outward troubles, and sufficient food, and pasturing the sheep where and how they should be pastured, from inward ones. Some breeds can stand more dampness of conditions, with its fluke, footrot, or stomach worms, than others, but it is not to be expected that any sheep, which was a hill or mountain living animal, and accustomed to well-drained soils, for maybe hundreds of thousands of years, can stand much of it.

Nearly all serious internal complaints of sheep are due to their grazing upon moist and swampy land, or on pastures befouled by overstocking. Fluke is acquired on low-lying, undrained ground. Worms on similar land or on wet, heavily stock pastures. And footrot appears through the dry-foot loving sheep being camped or allowed to remain too long on damp ground. The drier parts of a farm should be used for grazing the sheep during long-continued wet, and they should, under such circumstances, be given a regular supply of salt or a lick, and it should be aimed, where possible, to give them dry food, such as hay or chaff.

Footrot.—The feet should, in severe cases, be well pared, and if the following preparation, which had been mixed over a slow fire, is applied, it is efficacious in arresting the disease: 1 part bluestone, 1 of lard and 2 of tar. Or, after paring the hoof, if the following is well applied with a brush it is also said to arrest the disease: 1 tablespoonful bluestone and 1 tablespoonful of alum, put into a pint bottle of cold water. Butter of antimony, one part, and tincture of myrrh, eight parts, is also applied as a dressing. Fresh, powdery lime is a good preventive, and if placed around a salt lick will help a lot. The sheep should be given the driest paddocks in a wet season.

Blowfly.—Cleanliness, by way of proper dipping, dagging, and crutching are good preventive aids. When struck, the wool should be clipped from the part, the maggots removed, and there are several dressings, such as paraffin oil, or turpentine and paraffin mixed, that can be applied.

Fluke, or Liver Rot.—Due to the presence of flukes in the liver of the sheep. These are parasites that at one stage of their existence received a habitation in fresh water snails, and naturally, therefore, the origin of the complaint may be looked for where there is marshy, damp

land. They are picked up by the sheep from the moist pastures of such damp places, are swallowed with the grass, and pass from the stomach to the liver, where they thrive and commence their depredations. There is no known efficacious cure for the complaint, but placing the sheep on dry pastures is good, and if they have to remain on damp ground a supply of salt, which has an inimical effect on flukes, together with dry foods, will help the sheep on towards fattening for disposal, which is the best thing to do with them. A salt lick, consisting of 40lb. Liverpool salt, 1lb. sulphate of iron, is useful, or one of 6 parts salt, 1 part lime (powdered, slaked), and 1lb. sulphur is good.

Stomach Worms, resembling fine hairs about $\frac{1}{2}$ in. long, are found in the fourth stomach of the sheep. The small worms in the droppings evidence their presence. The sheep scour, and the complaint causes the loss of considerable numbers. Wet seasons and heavily stocked pastures are to blame.

Lung Worms, more often affect young sheep in wet seasons on moist land. Weaned lambs should always be put on to clean, young grass, away from swamps, grass that had plenty of sun on it. If the sheep on being put to run emit a dry, hard cough, it is a sign of lung worms. Their location is the bronchial tubes, where they are coiled threadlike.

Tape Worms are found in the small intestines, and are often several feet in length. Moist soil and pasture conditions the cause.

Sheep suffering from either of these worms present a rough-looking fleece, and their backs are humped. Damp conditions being the prime cause of them, feeding dry foods as a counteractive naturally suggests itself. With properly balanced feeding sheep would not be subject to them, providing their surroundings were at all favourable. The best use should be made of the pastures by

grazing the driest fields at wet times, and supplying such dry foods as hay, chaff, oats, wherever possible.

Several licks are recommended as being effective for worms. Thirty parts Liverpool salt, 3 parts lime, 3 parts flowers of sulphur, and 1 part powdered bluestone, is good, or 30 parts salt, 1 part sulphate of iron, and 5 parts bone meal (calcium phosphate). Many of the proprietary preparations, accompanied by directions for use, are good for worm complaints.

CHAPTER XLI.

THE SHEEP FARMER'S BALANCE SHEET.

It should be an easy matter for any sheep farmer to jot down roughly in a note book or journal his financial transactions as they occur during the year. From such particulars he can make up a statement showing the progress of his operations. The whole business should not take him more than a few hours in the year. The statement or balance sheet may be compiled in something like the following manner:—

DR.	£	CR.	£
Value of stock at 1/7/14 ..	500	Value of stock at 30/6/15 ..	600
Tools, seeds, wire, etc. purchased	75	Sheep sold during the year ..	200
Wages paid	100	Wool clip	150
Interest on loan	50	Valuable permanent improvements effected, less allowance for depreciation	100
Rates, taxes, etc	25		
Balance, net profit	300		
	£1,050		£1,050

If his living expenses come to, say, £150 a year, he can deduct this from the net profits of £300, and add the remaining £150 to the capital value of his farm, as he estimated it at 1st July, 1914, or as he had been offered for it, or as he had paid for it. This should, less mortgage, show his exact financial standing.

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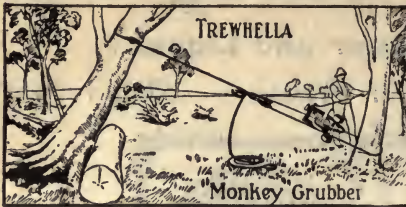
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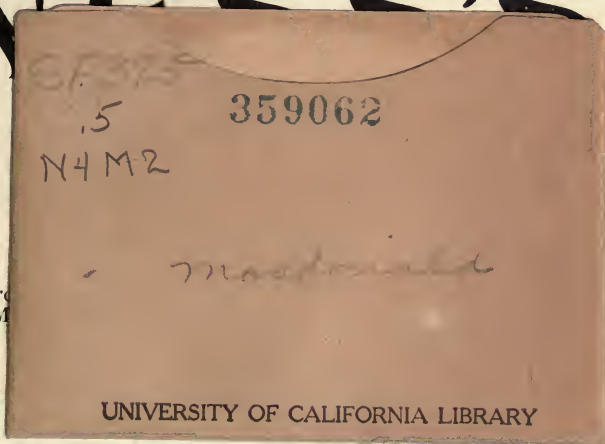
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