PASTURE SEED MIXTURES FOR HIGH RAINFALL DISTRICTS.

A. Stuart, Department of Agriculture, Invercargill.

In dealing with this subject it is essential to define the high rainfall districts, and on perusing a rainfall map it was found, contrary to expectations, that the greater part of the North Island, as represented by the 'Auckland Province and Taranaki, has a rainfall of over 50 inches per annum. In the same category falls the West Coast of the South Ialand and all of Stewart Island.

It would appear that even distribution of rainfall is more likely to occasion a district being syoken of as one of high rainfall rather than the actual rainfall measured during the year. Other factors would' be the retentive nature of the soil, evaporation and the effective drainage, which is influenced by the topography of the district.

In this gaper an encleavour has been made to confine remarks t o the coastal portions of Southland and South Otago where the rainfall is actually under 50 inches, but very evenly distributed over the year. It will be interesting to note the degree of divergence f rom Taranaki practice, bearing in mind the following stock statistics:

	CATTLE.	SHEEP.
Taranaki ...	389,216	643,316
Southland	167,709	2,560,737.

Attached to this paper is a table setting out the general pasture seed mixtures employed by various well-known Southland f armers. The most notable features are:

1. Liberal seeding;
2. Absence of Italian ryegrass; and
3. Inclusion of Tinothy in most mixtures.

These features require some explanation.

A heavy seeding is employed to render germination more reliable on a seedbed that often is coarser than the optimum, e.g., that obtained following a fed-off crop of turnips! swedes, or chou moellier, consumed under adverse weather conditions. Again, heavy rain falling after sowing, nay expose seed, later to be consumed by birds. Another factor is that most grass nixtures are sown with nursecrops, and as there must of necessity be some competition between the grass and the nursecroy, an ample grass seeding is provided.

The absence of Italian Ryegrnss is really bound up with the last mentioned practice, as the advantage of the Italian in providing early feed. and quick cover is lost, when the farmer has first to wait for his nurse crop to nature. In fact the presence of Italian nay be a distinct disadvantage in that it may provide unnecessary compe ti tion, where competition is already sufficiently intense.

At this stage it becomes necessary to *digress* somewhat on nurse-croys. These are practically all f sping-sown and consist chiefly of (1) cereals, mainly oats; (2) lamb-f eed, mainly rape or occasionally broadcast turnips. Generally speaking, better establishment of grass is obtained with the oat crop, and cases are often seen where better pastures follow this practice than where grass is *sown* alone. The additional shelter provided and

the greater length of tine elapsing before grazing permits more successful clover establishment, and a combination of these factors proves of decided advantage under Southland's climatic conditions. In fact in no other district-could nurse-crops be actually. recommended. It should be stated, however, that growth is not so rapid as to interfere with the harvesting of the oat crop, and that consequently the smothering effects of the more quickly establishing grasses are not pronounced.

In the case of rape the grass establishment is more risky, as growth Of this crop can be too prolific and where this happens the chances of a gsod grass establishment are poor. Rape is often sown through every second or third coulter of the, drill in order to ninimise this risk, On the other hand where club-root aay be expec ted, the rape aay be a failure and the grass successful.

To return to the absence of Italian ryegrass in mixtures when sown alone, this may be due to the aversion of farmers to false perennial ryegrass of whose fleeting presence they had ample evidence before the advent of certification. At the sane tine there remains the' chance of obtaining a seed crop of perennial ryegrass in 'the second summer and in those cases where uncertified lines of ryegrass are used sufficient Italian is usually present to cause the rejection of these lines as certified commercial perennial ryegrass. Where cocksfoot is ultimately to be relied on, Italian ryegrass has definitely a place.

The inclusion of timothy in nixtures is *not* unexpected, and there is plenty of evidence to justify the almost universal support it is accorded. Judging frou the mixtures employed it would appear that timothy is being used to a large extent to replace cocksfoot, the value of which can be summarised as follows:

(1) The inclusion of cocksfoot is justified in those districts where it is naturally suited, e.g., on welldrained land with gravel subsoil to be found uainly on the banks of such. rivers as the Waiau, Oreti and the Mataura above Gore, although in this latter case the rainfall recorded is below 35 inches. In addition there are generally one or more paddocks *on the* majority of farms where cocksfoot has a place.

(2) Those farmers not sowing true perennial ryegrass in their mixtures and those not prepared to topdress annually, derive great benefit from the inclusion of cocksfoot.

From a perusal of the grass mixtures it would appear that cocksfoot is favoured mainly by the dairy-farmer, and when one considers 'the overwhelming number of sheep-farmers who include cocksfoot at the rate of a few younds only in their mixture, the inclusion of cocksfoot at ail nay be of doubtful value. One must bear in mind that the most inimical factor in its establishment in a permanent pasture sward, apart from the light seeding, is the method of brazing employed on the sheep farm, and that is the set rate of stocking, by which immediately yrior to, or just after lambing a certain number of ewes are drafted into each paddock, and are allowed to remain there until the first draft of lambs is secured.

The fact that the crown of cocksfoot is at or above ground level and therefore is in serious danger of eliminati on by close and continuous grazing further reduces its value, and as seen over a big area of Southland, cocksfoot is persisting to some extent, but being so severely defoliated that the surviving plants are small and are able to nake little growth, On the other hand, timothy is better able to withstand these conditions as is evidenced by its greater density in these swards. It is rcalised that

there, is room for definite experimental work to determine if the total replacement of cocksfoot by timothy for these coastal districts is economically sound either under set stocking or intermittent grazing.

The position of crested dogstail now remains to be discussed, and the inclusion of this grass is certainly Justified in all cases where cocksfoot is Justified. Its earliness in the spring is of decided benefit to those farms which cannot hold ryegrass, but in the area under discussion the benefits of crested dogstail can be largely discounted.

In regard to the clovers, white clover holds pride of place from any point of view, and there is little difficulty with its establishment, in fact many farmers sow a reduced seeding as they consider volunteer white clover gives satisfactory results, Be that as it may, the life of a pasture should not be prejudiced by the lack of 2 - 3 lbs. of a'certified type of white clover.

The inclusion of Montgomery Red Clover has been tried with fairly satisfactory results up to the third year, but this clover persists much better when hayed in successive years, and one of the heaviest hay crops personally seen was that obtained from a sowing of timothy and Montgomery red.

Alsike has all the advantages of Montgomery Red. and in addition greater persistency under grazing, whereas Lotus major is included by those farmers who have the idea of securing a seed crop at some favourable later period.

A valuable grass for rich alluvial soils subject to periodic flooding is meadow foxtail and this grass has been used with great success at Mataura Island and on the banks of the Mataura river as far south as Gorge Road in Southland, and notably at Inchclutha in South Otagc. Complete success -and by this is meant complete dominance of this grass in the spring has been secured by including a light seeding of a ½ lb. per acre in the mixture at Mataura Island, although naturally the transition would take longer than where heavier seedlings were initially used.

In conclusion, it should be clearly understood that the bulk of the area under discussion would naturally revertt o browntop if left to itself, and that the natural high acidity of the soil has to be corrected by liberal applications of lime, as is indicated by the fact that practically one third of the total quantity of lime delivered by rail in New Zealand is used in Southland and South Otago.

TYPICAL PASTURE MIXTURES SOWN BY PROMINENT SOUTHLAND FARMERS.

Farmer and District.	Perennial Ryegrass.	Italian Ryegrass.	Cocksfoot.	Timothy.	Crested Dogstail.	White Clover.	Red Clover.	Alsike.	Lotus Major.	Total seeding lbs. per ac.
Blakie, J.J., Ryal Bush'	25	-	8	4	2	2	1	2	-	44
Chittock, C., Waikoikoi	40	10		2	2	2	2		-	58
Clark, W., South Hillend	25	-	3	2	2	3			-	35
Cowie, H., East Limehills	30	-	5	3		3			1	42
Dickie, R.H., Tututau	15	7	12	5		2	3	2	-	46
Dobbie, R., Menzies Ferry	30	7	10	2		2	2	2	-	55
Erskine, E., Papatotara.	20	-	7	4	-	2		2	-	39
Evans Bros., Longbush	20	10	4	4	1	3		2	-	44
Fleming, A.O., Mabel	30	-	8	4	2	2	1	2	-	49
Ford, W., Otahuti	20	-	10	4	2	2			-	38
Hall, A.W., Thornbury	30	-	6	5	2½	2		1	-	46½
Holms, A.S., Waimahaka	20	5	8	4	2	4	2		-	45
Johnson, A.R., Waikaka Valley	30	-	5		3	5			-	43
Linnsay, G., Drummond	30	-	5	4	2	2	1½		-	44½
Lynch'.@-os., Wreys Bush	27	-	6	2	2½	2		I&-	-	41
May, J.T., Winton	40	-	3	2	2	3			-	50
Macpherson, D., Waianiwa	30	-		3	2	2.	2	1	-	40
Nuttall, J.R., Long-wood	40	-	6	1½		2	1		-	50½
Plunkett Bros., Sth.Hillend	25	-	3	4	1	4			-	37
Plunkett, J., South Hillend	25	15		4	4	4			-	52
Robb, J., Lochiel	40	-	4	2		3		1	-	50
Rogers, J.E., Wrights Bush	30	-	2	6	4	2		2	-	46
Ronald, A.S., Waianiwa	40	-	6	2	2	3	1		-	54
Smith, H., Waikaka Valley	25	5		3	½	1½	1½		-	36½
Smith, T.S., Winto n	30	-	12	4	3	2	2		-	53
Stevenson, G., Dacre	30	-	7	3		3			-	43
Townshend, H.J., Orepuki	20	-	7	7	½	3	2		-	39½
Weir, A.M., Menzies Ferry.	20	10	6	3		2		3	-	44
White, R.S., Otama	20	-	4	5		2	-	-	-	31
Wilson, C.H., Lorneville	25	-	10	2		1	1	1	-	40.

, DISCUSSION ON TWO PRECEDING TAPERS._

Mr. Leitnh, Timaru:

In connection with Mr. Flay's mixtures, I should like to remark on his inclusion of Ryegrass with Cocksfoot, for special purposes. He has suggested 5 lbs. certified ryegrass to 15 lbs. cocksfoot, and 4/5 lbs. red clover.

Quite a number of farmers have endeavoured to establish cocksfoot by sawing a certain amount of ryegrass, but the two did not combine. At the time when the cocksfoot should be given a rest to establish, the ryegrass was being 'eaten sff, and when the ryegrass is eaten off the cocksfoot is damaged. It would be better therefore to leave ryegrass out, and go for the establishment with red clover.

Mr. Flay has mentioned that lucerne may oe included in special mixtures for the better light soils. Lucerne in South Canterbury is a very good crop.

On the Canterbury Plains where the rainfall is below 30" there are certain types of soil which are very poor, and under no circumstances probably could you get any of these "specials" mentioned to last for more than two or three years.

In Mr. Stuart's paper on Red Mont. Clover, his inference is that Red Mont. appears to last better under dry conditions. This is not borne out in South Canterbury, where it affords better grazing than hay.

Mr. Smallfield, Hamilton:

I was very interested in Mr. Flay's paper; One point I would suggest - that the term "Permanent pasture" should be used for 4 to 6 years. The usual terms in relation to N.Z. Grasslands are - "temporary", "short rotation" and "long rotation" pastures - and "permanent " should apply to those pastures which last fsr six years.

We use to a limits-d extent in Auckland Cocksfoot-red clover pastures, for breaking in light country. We do not think a great deal of them, but we use them because they are cheap to establish. Undsr our conditions I am quite sure that the cocksfoot-red clover pasture is nst as attractive as a lucerne crop would be.

Mr. Stafford, Timaru:

Permanent pastures are from 4 to 6 years. The more one goes into the question the more one realises that the life of a permanent pasture is only affected by its economic production. Once it becomes uneconomic in its production, it ceases to be permanent. From what I have seen in Canterbury, six years at the outside is the economic life of a pasture.

With regard to the mixtures, although I know Mr. Flay probably intends these pastures to be sown out at the correct period of the year, viz. autumn, it often falls to the lot of the farmer that he has to sow it at some other period, and I agree with Mr. Hurst in that respect. The farmer cannot always order his comings and goings to suit putting dswn his pastures, and I think it is necessary to make a suitable mixture for farming.

In connection with spring sowing, his quantities of red clover arc: rather too high. 6 to 8 lbs. total quantity of clover would tend to smother the ryegrass or other species.

Another point - in his mixtures for special purposes for light dry soils, I do not think his qusn'tity Jf cocksfoot is sufficient. He has frsm 12 to 15 lbs. cocksfoot down, and I feel that 15 to 20 lbs. ptr acre would be a better proposition.

Mr. Hurst, Oamaru:

- asked a question about sowing Montgomery clover on light land carrying 4 sheep to the acre.

Mr. Marshall, Timaru,

With regard to a lucerne mixture for shingle soils with cocksfoot in place of ryegrass - some small experiments have been carried out, and the inclusion of cocksfoot looks as if it would be warranted, - it seems to throw more feed during the summer period.

Mr. MacGregor, Qhai:

I should like to congratulate these two gentlemen on their very interesting papers. There is some anxiety at this gathering absut t.. seed mixtures for the low rainfall country.

We have not heard much in regard to what has been said by Mr. Stuart, but I should like to draw attention to his useful paper - it will be greatly appreci.ted in Southland.

We find no mention as to whether crested dogstail is making good headway Jr not. I know a man who is in a good position now in Palmerston North - hi; always said that he never went on a farm that had crested dogstail sni t but he got a fat lamb.

Mr. Calder, Alexandra:

Is there not a place for inclusion in the vtry dry country of prairie grass? In Canterbury this has been the mainstay of the dairy farmer in producing green feed. I think there is a place for it.

Mr. Marshall, Timaru:

Regarding the inclusion of cocksfoot in Lucerne paddocks - this has been done in quite a number of places in Central Otago. They sometimes include rye, but cocksfoot is the main plant. It is considered to give a better balance, and it also gives a bigger fibre with the hay.

Mr. Hamlyn, Palmerston Nor th:

I should like to remind the S.I. people that I do not think many of them have yet seen something we have to our credit - and that is the production of pedigree ryegrass and pedigree white clover. Just in this last year pedigree rye was produced in Hawkes Bay - the home of the mother rye - and without exception the growers of this grass are satisfied that they have got something infinitely better than they had before.

The Chni rman:

I feel rather, Mr. Flay, in the paper you have written you have had certain notions in'ysur mind which we all must have 'had in our minds fsr a long time, yet you have not been sufficiently prepared to go the whole way. I think most of your paper lies along the line of indicating that on soils with a low rainfall, and particularly if the early spring is a period of comparatively little growth, you have brought up the suggestion that it would be advis-

able for pastures on that type, of country to have a considerable amount of rough summer feed on tham. I should just like to bring out this position as it occurs to-day in certain of the comparatively inland parts of Victoria and New South Wales, on moderately fertile ground enabling a pretty considerable growth to take place in the winter and early spring. What is largely occurring in those districts is the use of Subterranean clover, from the point of not so much making use of this clover while it is growing!, as of making a great deal of use of it when the dry weather has almost completely dried it up and there is no further growth on it. I feel that if provision for what we can call "rough summer feed" is one of the essentials of our fattening grasslands on low rainfall soils, particular attention should be given to the mixture, as it should be one which provides a fairly nutritious amount of feed after the growth has got away. If this is ths end to be aimed at, sne feels that a grass such as perennial rye, which is certainly very little use when it has got away to dry up, should be eliminated altogether.

I have been very interested in. this suggestion, It is by no means new, but has never been properly tried out in N.Z. so far as I am aware, in the effort to grow, while soil is moist, a pasture with a sufficient amount of feed which will carry that pasture through from a stocking standpoint over very considerable periods of very dry weather.

In parts of England, N.S.W. and Victoria, the whole of the late lamb fattening, and the whole of the later drafts of lambs, are fattened entirely there. on subterranean clover which has completely stopped growing and on which there is the equivalent of a good deal of naturally dried material. One wonders whether paddocks for this specific purpose should nst be set aside in the low rainfall areas of N.Z., and whether such paddocks should not be almost entirely composed of clovers.

Mr. Flay, Lincoln:

Mr. Leitch dealt with the question of mixing 4 to 5 lbs. of rye with the cocksfoot on dry land areas, to fill up hollows and form a complete carpet. I am not satisfied that 4 to 5 lbs. with the cocksfoot will fill up, sowing either early spring or early autumn on a fallow seed bed. Ryegrass used with cocksfoot needs care, but I would not completely omit ryegrass.

Some suggestion was made about two ytors being the life of even good species on light dry land. Mr. Marshall negatived that idea when dealing with 11" of rain on the Grampians, where good species last much longer.

Mr. Smallfield raised the question of 4 to 6-years being long rotation or permanent. I think that would be a matter of opinion rather than any hard and fast rule.

In regard to cocksfoot and red clover, I assume he was referring to Mont. red clover. I do think that Cocksfoot and Mont. red, as well as lucerne, have a place on these dry areas.

Mr. Stafford raised the question of six years being the economic life of pastures on these low rainfall areas. This is very difficult to decide because of the great variations in the climate - even cocksfoot and the more permanent clovers have bean burnt up and have had to be ploughed up and resown. With the aid of topdressing we should get pastures lasting much longer than a six-year period.

With regard to spring or autumn sowing - I contend that provided the seed bed is properly prepared we can sow September to December and again in February to early March.

Mr. Hurst asked if red clover should be used for lamb fattening. We know that red clover carried forward in the summer time in a semi-wilted state is excellent for fattening.

.I have had no experience of mixing cocksfoot with lucerne nor do I know about the use of prairie grass for very dry country.

I think the Chairman has hit. the nail on the head when he suggests that we are attempting to secure something for these low rainfall areas that will in an economical manner carry us over the dry period.

The Chairman

One feels that on areas where there is only a limited rainfall , there are only two types of plants which are likely to be successful - one of them, our definite annuals which will reseed themselves, and the o ther, our deep-rooted plants. We cannot put rye in the caregory of a deep-rooted plant, but that does not alter the fact that the work which is being done on the Grampians will ultimately get from' it a real type of vegetation of a good feed character that is likely to be maintained on ground, the conditions of which **are** such that we cannot really expect a closed association.