

THE PLACE OF PERMANENT PASTURE IN BACK COUNTRY SHEEP FARMING.

(C. S. Marshall, Otipua Road, Timaru.)

The presentstate of the **ploughable** lands of the back country of the South Island gives ample evidence of the fact **that, up to the present time, the** turning over of tussock lands has not been to the **benefit of** the run-holder. It **has been** found that after the first **crop** or two of supplementary feed, **namely, turnip and green** feed, it **was** impossible to establish **permanent** pasture or for the land to return to its previous state. The majority of run-holders was not long in realizing that **it was** folly to **continue** with such a practice, and today we have run-holders who have never ploughed tussock but who have seen the results of such **ploughing**, wintering their **hoggets** down country on bought turnips and other supplementary feed.

In this paper it is proposed to show that Permanent Pasture of high producing qualities, **practically** equal to that which exists down country, can be established and maintained on some **of** the flat tussock land in the back country.

Gentlemen, you will **realise** that **this** will lead to greater possibilities other than the mere **growing** of turnip and green feed, which are essential to the successful wintering of the **young** stock required to maintain the **flock**. By being able to **spell** the hill country, it **opens up** the possibility of **increasing** the carrying capacity and **wool** clip, better wintering **of** ewes and consequent increased lambing percentage; breeding of half-bred lambs **for** sale, and **fattening** of cast ewes **instead of** selling them at ridiculously low prices.

The Grampians Station, which is owned by Messrs. Hope Bros, is situated on **the east** side of the Mackenzie Plain and the area known **as** the farm is from 1,500 to 1,900 feet above **sea** level and subject to a wide variation of climatic conditions. The **annual rainfall** is from 12 to 133 inches, a large **proportion** of which often falls on frozen ground thereby being **useless**, and also the area is subject to strong Nor-Westers during **spring** and summer. The soil is a "loess" which cakes and cracks badly in the **summer** and pastures often require to be harrowed to prevent loss of moisture,

The possibilities of the benefits to be derived from the establishment of Permanent Pasture have always been **recognised** by the **owners**, and, through their help and co-operation, **it** has now been possible to establish successfully and **maintain** Permanent Pasture practically equal to anything down country. This Station has always been more than willing to adopt and consider favourably, where suitable, **any** reasonable suggestion that would lead to this end. Messrs. Hope Bros. deserve our thanks for making it possible, at considerable expense to themselves, to produce the evidence which is to follow.

This Station grows annually about 150 acres turnips, 80 to 100 **acres** oats for **crop**, and 50 to 80 **acres** oats, ryecorn or Italian **ryegrass** for green feed. It has 40 acres of **lucerne** which is cut for hny, as well as 4,200 - 1,300 acres of Permanent Pasture. The total carrying capacity of the Station is 18,000 sheep, which **represents an** increase of 4,000 during the last 15 years. This is directly the **result**

of bringing a portion of the flat land from its native state into the present high producing Permanent Pasture. Besides this, the Station now sells annually about 3,000 ewes and **wether** half-bred lambs, and fattens 1,700 to 2,000 cast Merino ewes, neither of which would be possible without the aid of Permanent Pasture and supplementary green feed. This past season the cast-ewes were partly fattened on young Permanent Pasture, which to a great extent took the place of green feed.

It is not to be supposed that this objective has been **achieved** without innumerable failures. Before certified seeds **came on** the market, we had attempted, by varying the mixtures and increasing the quantities **sown**, to overcome the problem of pasture deterioration after two seasons. It was **found** that by the inclusion of larger quantities of Alsike in the mixtures, after two seasons the pasture became a dominant **stand of Alsike** clover. **This**, however, under these conditions, is a very seasonal producer and cannot take the place of Permanent Pasture.

Since it was supposed that only **the** type of the seed **sown** was at fault, with the advent of **certified** seeds it was considered that the **problem** had been more or less solved. **Later sowings** were made of certified seed only, and it **must** be appreciated that, at this time, certified seed could be **purchased** only by paying through the nose. **Ryegrass** formed the **basis** of the mixture, and it was found that though it produced **favourably** for two seasons and still lived, it failed to produce feed in any quantity, and there was a great tendency for the plants to become individuals instead of a close sward. **Even** with the inclusion of Montgomeryshire Red clover and certified White clover, it was still **impossible** to produce the **satisfactory** sward necessary for a permanent pasture. **The** plants for some reason still tended to become individuals and, although we **were getting** persistency, we were not **getting** productivity.

The inability to produce a satisfactory sward was partly due to the fact that for weeks at a time up to 30 to 40 degrees of frost **were, and are**, often experienced. At this period there is often a partial thaw during the day, and this condition of partial thaw and **freezing** tends to lift the plants in such a manner that they become tufty. Under such conditions even docks are lifted as high as from 4 to 5 inches out of the ground, and in the **lucerne** stand the crowns of some **of** the plants are as high as 3 inches above the surface. With this condition prevailing throughout **the winter**, and the thaw in spring being almost immediately **followed** by two to three weeks' strong Nor' west winds, a proportion of these lifted plants died. The remainder had such a struggle for existence that they produced very **little** feed, and, with the extremes previously mentioned occurring again the following year, a percentage of these also died in the next summer, leaving the pasture very open, and **these** gaps to some extent **then** filled with *Poa pratensis* and *Bromus sterilis*.

In attempting to overcome the difficulty of the lifting of grasses and consequent **inability** to produce a **sward necessary** for Permanent Pasture, **the** mixtures were varied and the **amounts** of both **ryegrass** and clover were increased. **Realising** the value of ryegrass, this particular ingredient was increased as high as two bushels per acre. Even these high seedings still failed to produce the desired effect.

About this time, at our request, Mr. Bruce Levy kindly visited the Station and, after studying the position carefully, thought that if the crowns of the **ryegrass** could be kept in the ground before the hard summer conditions did their damage, it would be possible to maintain the closeness of the sward. Acting on his advice, and to put his idea into effect, a roller was made **which consists** of three iron cylinders each three feet long and 2 ft. 7 ins. in diameter. Each cylinder is built into a frame, the frame of the front cylinder being so constructed as to **enable the other two** cylinders to be connected with the outside rear portions of this frame and slightly overlap the front cylinder at **either** end, thus giving a total overall width of 8 ft. 6 ins. Each cylinder when filled with sand weighs about 2,000 lbs. and the weight of each cylinder with its frame is **3,100** lbs. The roller has been used on pastures of varying ages with great success, and the death rate in these particular pastures **has** been reduced to almost a minimum.

The method effected a considerable improvement, but the pastures **still** did not throw the **desired amount** of feed, and it was felt that it might be possible to improve on the **pastures, and** at this **time we** were fortunate enough to find a special grass seed drill with a **4½ inch** centre. It has always been **recognised** that grass sown with the drill gives a much better establishment and ultimately a better pasture. Up **till** this time, however, only a **7 inch** drill had been available and this had not been successful.

Messrs. Hope Bros. purchased **one of** these *new* drills immediately the **possible benefits** were explained to them, and it is **gratifying to** know that this purchase has been amply justified. It **has** the advantage that, in a **dry** summer, seed can be put to the moisture away from the top hot dry soil, thereby enabling a quick strike which is essential to successful establishment. The development of the grass and clover **soon** fill up the spaces between the drills which is not the case when a **7"** drill is used. The disadvantage with this drill is that it is not fitted to sow manure with the seed.

Last spring the new roller was **used** on a portion of the area to be sown in Permanent Pasture, the idea being to find out to what extent this consolidation **would** benefit the establishment and later the frost lift. **In the case of the former,** there was a slight improvement, but it will take a **year** or two yet to ascertain the effect of consolidation on frost lift.

Whenever possible, all Permanent Pasture has been **sown** without a cover crop, but in future the sowing down with turnip will be **kept in mind;** the reason for this being that when the last field was sown with turnip, **the grass was** sown through the new drill, and, **although no rain** was experienced for a month before sowing and two months after sowing, a wonderful strike resulted. Besides this **fact,** as Mr. Levy **pointed out,** the amount of nitrogen supplied by the stock was **having** a very beneficial effect on the grass. This fact is well worth keeping in mind. Because of the improved rooting system of the plants, the grass was not 'damaged by feeding, as is the case when sown broadcast.

The drilling of cocksfoot and **Montgomeryshire** red clover **has** proved **successful, beyond** expectation, in that the establishment of the cocksfoot was assured, **and** this was not the case when the seed was broadcast. **One area,** when twelve

months old, was superior to most fields which were seen after they had been sown from two to three years. There is no doubt that areas of cocksfoot and clover, when drilled, should be sown without any ryegrass. It has also been proved that to SOW cocksfoot in a dominant ryegrass stand does not pay. These methods could well be applied down country to great advantage.

Lime has not been used at the Grampians for many years, because there did not appear to be any better growth of the pasture, and the sheep did not show any preference for the limed areas; this also applied to the lucerne stand. However, experiments are again to be carried out on the now good Permanent Pasture, and results will be carefully noted. From 300 to 400 acres of the Permanent Pasture on this Station are topdressed with Super every year. In the case of some of the old fields where uncertified seed were sown, the pastures are very open. When topdressing these areas, three to four pounds of Alsike is broadcast with the Super and harrowed; this enables the owners to maintain a payable pasture until such time as the field can be broken up and sown with certified seed.

Phalaris tuberosa is also being tried in the Hakataramea Valley, but it is yet too early to pass any comment other than that this grass appears to be standing the present severe winter very well. Further areas will be sown this spring, both in the Hakataramea Valley and at the Grampians.

Permanent Pasture on tussock land on the down country side of the range has definitely responded to liberal application of lime. One man who has 868 acres has 600 acres in excellent Permanent Pasture, 20 acres Lucerne, 100 acres undercultivation and about 100 acres of rough country. Four years ago he carried 800 ewes, 200 dry sheep plus a few cattle; today he has 1,350 ewes, 400 dry sheep and 40 head of cattle. This increase is all due to excellent management of Permanent Pasture sown with certified seeds and the liberal use of lime (from 1 to 2 tons per acre) and maintaining the fertility by topdressing with Super.

From the knowledge gained at the Grampians, it is now possible to advise others on similar classes of country. One run in Hakataramea Valley, which was taken over by a new **owner** eighteen months ago, is already well on the way to establishing Permanent Pasture. At the moment this run has 300 acres sown in young grass, where previously only *Poa pratensis* and rubbish held sway.

It must be realised that up to the present, all the work which has been carried out has been done at the expense of the various run-holders. There is, however, still a considerable amount of research work to be done; this, coupled with the fact that on the whole the carrying capacity of back country runs of the South Island is admittedly diminishing, must surely supply sufficient reason as to why the problem should be taken up as a National one, rather than being left to the individual. Copious evidence has been given above to show that results can be obtained and it does not require a great deal of imagination on anyone's part to visualize the benefit to the country as a whole.

DISCUSSION ON TWO PRECEDING PAPERS.

The Chairman (Mr. A. H. Cockayne):

In the two papers which have been presented to us, perhaps the point that we should keep very strongly in mind with regard to both these areas of country is that they in themselves do not differ intrinsically from other places.

In the address of Mr. McGregor, he has been dealing with tussock country on which the future lies almost entirely along the line of preserving, or improving, the present vegetation contained thereon - just as we have the same problem in the North Island in a great deal of our hill country where many of the factors towards the production of permanent pasture of types essentially different from the original vegetation are not possible.

Then again, in the hill country of the North Island we have very large areas where a certain amount of land becomes ploughable, and there of course some of the imperative work along the line of pasture establishment of a permanent type is highly successful, and one feels too that with regard to much of the tussock country of the South Island the farmer has rather taken the stand that because in the back country the natural vegetation was tussock, it would be quite impossible - or at any rate would not be payable - to make any effort towards the establishment of permanent pasture.

The two papers we have just listened to bring forward very clearly the fact that in the hill country, whether it is tussock country or the depleted forest country of the North Island, there is the tremendous problem of what to do when ploughing and topdressing are not applicable - and one of the papers shows that on many of the runs in the tussock country of N. Z. there are large blocks of country which, although not so well climatically fitted for the production of good pastures as the lowland country, yet possess large areas that could be definitely improved - not, however, simply by the improvement of the structure of the original vegetation, but by the production of an absolutely new vegetation which was alien to that originally existing on the country.

I want particularly to bring out the point, both in the North and in the South, that although we are using a generalised term for the 14 million acres of tussock grassland in the South Island and the 8,000,000 or so acres of grassland in the North Island of what we term our hill country, they cannot be deemed, either of them, as single-entities, but possess within themselves extreme ranges of differences on which a pasture management can and must be adopted.

Mr. R. McGillivray, Christchurch:

Mr. McGregor in his paper points out that our pastoral country covers an area of 6,000,000 acres. This should bring forcibly before the members of the Conference the importance of the subject we are considering this morning.

The properties that have been mentioned in the two papers are more favourably situated than many others when one considers means of access and the area of agricultural land attached to these properties.

When many of the original **station properties** were subdivided a tremendous mistake was made in **many** cases **in not** allowing sufficient winter country with the result that it is **now** almost impossible to manage some of the runs **successfully**.

On the other **hand**, there are runs without **any** summer country and these, in many cases dry out in the **summer** to such an extent. that the carrying capacity is **very low**. Runs under such conditions are often as difficult to work as **those** without **winter** country.

Where agricultural land is attached to any station property full use should be made of **it** to provide winter feed. In numerous cases this is being done and in sowing down pastures good types of grasses and **clovers** are, being used **followed** by topdressing.

Hay **is** saved in many cases and in some places ensilage is made. Lucerne **is** now grown extensively **where** soil conditions **are** favourable and is providing abundance of hay against a time of stress.

Over very large areas of the country Under review very serious deterioration has **taken place** and thousands of acres are so depleted as to come almost within **the** category of desert land.

Indiscriminate **burning**, overstocking and the rabbit pest, etc., have all contributed to this deplorable condition of the run country but in my opinion **the** greatest culprit has been the indiscriminate burner.

In many **parts** judicious burning **is necessary** at times as pointed out by **Mr. McGregor**, but there should not be any burning of the tussock **grasslands** during the summer **period**.

Most of the shingle slips on our **grazing country** owe **their** origin to indiscriminate burning which completely destroyed the vegetation and left bare ground. Soil erosion followed with the result that **there** are thousands of acres of shingle where formerly there was well-grassed **country**.

On many pastoral properties **surface** sowing of various grass mixtures **has** been undertaken with very marked **Success**.

On the drier, country it is almost **impossible** to get a **strike** on the lower sunny faces but on the higher levels and dark faces cocksfoot, crested dogtail, fog-grass, etc., **have** done well and white clover is well established in places.

I still have faith that Crested wheatgrass is going to give good results on **our** runs but it is **difficult** to **obtain** supplies of seed from North America. An area on the **lower country** at **Kyeburn** is giving excellent results.

In run management proper subdivision is most important but is often very costly. **At** times there has been wasteful expenditure on subdivision owing to the work not **being** done to the best advantage because of inexperience. **When** you find **a** case where there has been an expenditure of £1,600 **on** fencing and only about 50 more ewes are carried you will agree with me that there has been uneconomic **subdivision**.

I believe, however, if less than half the amount mentioned had been wisely expended in preventing the sheep grazing the winter country in the summer time that a wonderful return would have been shown for the outlay in the way of increased carrying capacity.

Cattle are important, especially in the better rainfall country and also in the swamps anywhere. Greater use should be made of cattle, because if a reasonable number were carried the rough gullies, flats and swamps would be cleared of roughage and there would not be the same necessity for the burning that normally takes place.

A system of run management that has been criticised is where the run-holders send fairly large drafts, principally of young stock, to the Plains to winter on turnips or other feed. I consider the practice quite sound where agricultural land is absent or good winter country is insufficient. The cost is high but it is an excellent insurance against a wipe-out in a bad snowstorm and it actually enables a heavier stocking of the runs to take place.

In viewing the pastoral country generally I am satisfied that all is not well with it. Even with the present high prices it is taking many run-holders all their time to show reasonable profits. Costs are high, especially where means of access are indifferent, as they are in many cases.

I do not wish to be an alarmist at all, but in certain parts where means of access are difficult, or, in other words, where roads are almost non-existent, a crisis is approaching. With a serious drop in the price of wool there will be large areas of pastoral land going begging. The question will then arise as to what is to be done with that country. It cannot be left vacant.

At the present time in the back country of Marlborough there is an area of approximately 550 sq. miles of country to all intents and purposes abandoned by the former occupiers. Some experienced high country men consider in a proper classification this would all be considered summer country. I would suggest under these circumstances that the area be roaded and carefully subdivided and offered for summer grazing only.

A thorough investigation of our pastoral country from all points of view is urgently required.

The late Dr. Cockayne's work should be followed up. His work was of immense importance but its value has never been fully appreciated.

Let us go ahead and endeavour by all means in our power to safeguard and improve this wonderful heritage.

Mr. G. G. Calder, Alexandra:

The question of burning grassland country is always brought up. It is probably the biggest danger we have, and probably the biggest cause of deterioration of our land, but it is really essential, in the form of an insurance premium against total destruction in the summer. In Central Otago especially, where the rainfall is light, if the farmer does

not burn off his grass for three or four years, there is always the danger of fires in the summer caused by rabbiters, hikers and picnic parties, when a burn would probably destroy the whole country and there would be practically no chance at all of ever bringing it back as a grass proposition,

One must burn periodically as early as possible, but the idea of closing the land up and never burning means running the risk of losing it altogether.

Another point - that of over-stocking. At the present time there are many thousands of acres in Central Otago with tussocks standing on them which are completely dead - you could pull them out with your hand. They died within the last 5 to 6 years and are still dying. The rainfall which in 1917 was 19 inches at Alexandra is now down to about 12" and has been as low as 9½" in the last year. During the slump period there was a good deal of over-stocking on a number of these runs. When owners had surplus sheep it was only natural that they should carry them on for another year in the hope of prices improving. Unfortunately the expected rise did not come about, and they went on carrying a few more, and more - and along with the extra stocking there were extra rabbits, because there was no money to control them, and in consequence thousands of acres of tussock country in Central Otago have been ruined, and today they are dead.

Another thing which has been detrimental to the carrying capacity of the Central Otago run is the failure of the Star thistle. On all the sunny faces a number of years ago you got your Star thistle growing. It came away in the autumn and grew into the seeding stage. It remained green all through the winter and came away in the spring - grew to 6 feet, dried out early in the summer and stood there as rough hay for feed that carried the sheep on until the autumn again.

Surface sowing has been carried out on Central Otago for many years at different periods - ryegrass, cocksfoot, different clovers - but one of them were any good whatsoever except in damp corners and, in crevices amongst the rocks, where you still find occasional clumps of cocksfoot. The species sown has been at fault, but I was rather surprised, I must admit, to hear of establishing ryegrass and clover pastures where there was a rainfall of about 12 inches. This will be watched very carefully by run-holders and sheep-farmers in Central Otago. It is considered that you cannot possibly do it on such a low rainfall. I should like to see this cocksfoot pasture.

Mr. Shand, Kyeburn:

I should like to hear something about the Blue tussock. It has largely disappeared, but there are still a few patches left, and it would be interesting to know how we can rejuvenate it. It is one of the most beneficial of the tussocks.

With reference to Mr. Marshall's remarks on the sowing of pasture, my property is under similar conditions to the Grampians. Unfortunately Messrs. Hope Bros. got in

first and purchased the drill. I used a 7 inch drill and **crossed** it, and should like to know if they have tried anything of that nature.

I find that in sowing seeds in the dry areas YOU **must bury** the seed. The use of the **coulter** drill is **not so** successful as the disk drill, In using the 7" drill I find that **in** two months, although not much plant growth was visible below the ground, the actual root system was extremely **well** developed, although **it** did not actually **join** in the drills.

My rainfall varies from as low as 7" up to about 14" per annum, up in the **Kyeburn** district. At Kokonga I have **been** very interested to hear that they have used the method I have **tried during** the last two years, of cross **drilling with the 7" drill**. For general work the 4" drill appears **too light**. Were there a more durable drill of the 4" **variety** I am sure it would be an advantage.

Mr. Marshall:

Mr. **Shand's** remarks are very interesting. Things **became** so drastic **about** three years ago that "the **Grampians**" **certainly** considered throwing up the sowing of pastures. **But once tussock** land is broken up, what are you going to do with it? You cannot leave it, as it will go back to **Poa pratensis** and other **poor types**.

It was just about this time that **we** were fortunate **enough** to get the roller and **drill going**, and we are now on the way to get satisfactory **results**. We have been sowing **seed** for 11 or 12 years, and I think the last 2 or 3 Years **are the** only ones in which we have had anything **successful**.

With regard to cross drilling, **it has** been done but **we** do not like it for two or three **reasons** - the main reason **being** that **you** get a 7" blank square, and you get a double **dose of seed** where **the drill crosses**.

The only advantage we **could** find was that **the** manure was scattered with the **seed**. This is a big point. There **is** another drill on **the market** which can sow in **3 1/2 inch centres** and sows manure with the seed. This drill is made **with 3** rows of **coulters**.

I have approached the International people to see if their principals would manufacture a drill of this **kind**, **that** will sow manure with the seed, **That is a very vital** point.

The 4" drill has been used for two seasons, during **which period they** have done 300 odd acres. I do not know **any** country that will wear more than this **type** of soil. Although the drill looks light, I do **not think** there is anything that will give great concern for a **number** of years. It has been very satisfactory, and has got **the** stuff in it. Unfortunately any Colonial **manufacture**, to get durability, **must** have a mass of weight.

Mr. Faithful, Gore:

In the **tussock** country near **Lumsden** there are several hundreds of acres that are being **absolutely** choked

out by the ingress of manuka. I was up there a short while ago, and was asked if anything could be done to keep it down.

The owner has been in occupation of the area I am speaking of for 25 years, and had previously seen no sign of any manuka on his property till quite suddenly these hundreds of acres were invaded by it. It is now becoming quite a menace, and there must be some means of checking it. All I could recommend at the time was that he should keep it under control round the edges. Can anyone suggest a remedy?

Dr. Allan, Wellington:

Blue tussock and Blue grass m e d o u b t in the minds of speakers just what species is meant. There are two very different plants, There is the Blue tussock species - *Poa colensoi* - and the intermedia variety - both of which are still quite plentiful in many parts of the tussock country. Probably, however, it is the Blue grass which we call *Agropyron*. In contrast to the other this is a creeping grass, although you find it in cultivated areas now in loose tussock forms. On examination, however, you will find that it has a creeping root stock, which extends over quite a considerable area. In early days this was wide-spread through the tussock country, but is now rather difficult to find. It is much liked by stock and has therefore suffered from these over-stocking conditions we have heard of. It has also suffered from indiscriminate burning, and therefore the result has been that a very valuable grass has to a very large extent disappeared from the tussock country.

One still finds it in the shelter of individual plants in the less damaged tussock areas, and one finds also that if an area can be shut up and all classes of stock excluded, this grass will again form quite a distinct and important feature of the community that arises. You can see it round about the Clyde area, near the cemetery, and it is in a plantation as you go up Burkes Pass, in the Mackenzie country. The problem is, how are you going to get it, as well as other grasses, back into the country that you cannot use as anything else than tussock country? How you are going to do this, I cannot tell. It is definitely one of the grasses that we should cultivate.

Mr. G. A. Holmes, Wellington:

The question of tussock grassland and its improvement is of tremendous importance in the South Island.

I feel that Mr. McGregor has put his finger on what is perhaps the most urgent need - that there should be a thorough review of the tenure conditions under which these lands are held. When this has been carried out, a report should go forward to headquarters in regard to the short term lease, and the disabilities of such tenure.

What farmer is going to start extensive work on his run when perhaps in a very short time his lease will run out and the property will be cut up?

Mr. McGillivray mentioned the introduction of a new species of Crested Wheat grass giving excellent results in Central Otago. Coupled with same form of assistance to run-holders in regard to the improvement of their blocks, it

should be possible to carry out some experimental work on the lines of the testing out of new species, as was done formerly by the late Dr. Cockayne. For instance, the introduction of Australian **Saltbush** into Central Otago might not be so valuable from a pasture point of view as from **the** idea of giving shelter and a little shade, and so enabling summer grasses to hang on.

Mr. Marshall, Timaru:

I think with **Mr. Holmes** that a great deal of the lack of initiative shown by **run-holders** is because they are frightened of losing their leases, or having their places cut up - **consequently** they argue that they cannot afford to spend the-money.

Mr. Ballinger, Hamilton:

My experience has been gained over a number of years in the Mackenzie Country area, where I have actually mustered alongside the next man. I advocated last **year** that some form of advance should be made to run-holders, because in nine cases out of ten their **problem is fencing**. Winter or summer country on many of these runs is a question of hunting your sheep over **the** tops of the hills, down **into the** gullies and back on to the dark faces, and keeping them there. Fencing at **the** present time **costs** about £100 per mile. You look at **your country** and say - "I **must do ten** miles of fencing - but where am I to get the £1,000?" If you do not fence your property, the cattle will naturally **wander**. If you take them on to winter country, the first thing they **do** is to follow you back as hard as they can to summer country,,, This has **been my experience** in the Mackenzie Country.

If you can subdivide your land summer and **winter**, you can divide it for spelling. If you cannot **raise up** a fence, the **stock** will again be **on to your** new grass as hard as **they can**.

With regard to rabbits - probably-the greatest, 'problem next to fencing - although it is said that rabbits ruin a **country** for all time, yet **Mesopotamia Station** has over a period of about **ten** years trebled its carrying capacity **4/5000** in 1919 through a policy of rabbiting every year. Another Station I know of spent **£2,000** in four **years** in getting the rabbits away.

With reference to manuka, the only **grass** that will stand up to this is Danthonia. You can, however, keep your **manuka** down by subdividing the land with fences.

Chairman:

We have had two most instructive papers, and two extremely interesting discussions in connection therewith. I **should** like to speak on two or three points that arise out of the papers and also out of **the** discussions.

The first thing one feels is the necessity of **knowing** as much as it is possible to know about the **management** of **tussock** so that it exerts its greatest benefit in **enabling** what we term "bottom feed" - to be developed. Mr. McGregor's paper was essentially one which brought out **that point** - namely, the necessity for the tussock to remain an integral

feature of the vegetation of tussock land from the viewpoint of its beneficial effects in relationship to other feed which may be provided for stock.

(2) Utilising the ploughable ground in the back country to develop permanent pasture, as suggested by Mr. Marshall -

(3) The rather general feeling among many of our members that there is room, and necessity, for some real practical and scientific investigation of the whole of the problems of the tussock lands of the South Island -

and to that third one I would add another - The necessity for correlation in investigational work upon the tussock lands of the South Island, with careful studies in other countries where similar conditions exist - and the reason one brings forward what one feels is the absolute necessity of having duplicate studies in other countries in connection with this very important problem, is the fact that in many of these other countries a vegetation not dissimilar to that of our tussock country in New Zealand has developed under circumstances which were not in existence in the development of our own tussock grassland, namely, the tussock lands of many other countries have developed in the presence of grazing animals, whereas the whole structure of our tussock vegetation was controlled to a very large extent by the climate alone.

One feels that the essential thing is that the tussock itself, if possible, must be held as the central framework of our high tussock country, but there is a great necessity of getting a superior type of bottom herbage to what we have at the present time. This is more likely to come from the introduction of bottom herbage type vegetation which during the whole period of its evolution has been developed with the help of grazing animals similar to those we now have in New Zealand.

Such investigational work, undertaken for specific reasons and undertaken after the study of the particular plant has been made in other countries, is probably one of the most important phases which will lead to an improvement of our tussock country.
