
PRAIRIE GRASS AS A SUBSTITUTE FOR SHORT-ROTATION RYEGRASS

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Prairie grass (*Bromus catharticus*) has been recognised as a valuable species in dairying pastures for many years in the warmer and more fertile areas of New Zealand.

Its popularity has been favoured mainly for its excellent growth during the late autumn, winter, and spring and for its high palatability to all classes of stock. But because of certain disadvantages, prairie grass has taken a back seat over the last decade in favour of short-rotation ryegrass.

Prairie grass, a native of tropical America, is an erect, tall-growing plant, heavy seeding, and, though perennial in character, is often short-lived if subjected to indifferent management such as over-grazing, inadequate fertility, or if grown in unsuitable soil or climatic conditions.

Short-rotation ryegrass, also renowned for these same favourable growing and palatable characteristics, was considered to be more adaptable over a wider area. Consequently, it replaced the possibility of prairie grass in new pasture and less attention was given to the importance of this grass as a valuable pasture plant by grassland scientists and farm advisers.

It is now 18 years since short-rotation ryegrass was released for general distribution and during this period farmers, farm advisers, and grassland scientists have had a wide experience with its behaviour throughout New Zealand.

Our plant breeders have continually improved its characteristics and have tried to eliminate its weaknesses. Much has been written concerning its value and shortcomings and to summarise I need only remind you of the symposium on this subject presented at the ninth conference of this Association in 1957.

In all such records it is generally agreed that the main value of short-rotation ryegrass is its ability to produce an abundance of highly palatable bulk feed during its *first* winter and spring, but subsequently it lacks the ability to maintain itself at a high level of production unless it is given the opportunity to reseed.

Its lack of persistency is credited to such factors as its inability to stand dry summers, grass grub attack, **hard grazing**, and conditions of low fertility.

By 1956 an improved strain of short-rotation ryegrass had been announced which was approximately 50 per cent better than the original strain and vastly superior in subsequent summer and autumn production. This improved strain has been commercially available to farmers over the past three to four years, but the problems associated with its inability to survive more than one or two seasons without reseeding are still with us.

In the south group of the South Taranaki Farm Improvement Club over 4,500 acres of pasture has been sown in new grass or undersown during the past seven years. Practically all of these pastures have contained a varying proportion of short-rotation ryegrass, treated with DDT for grass grub control, liberally fertilised with phosphates and potash, and by and large they have been well established and managed.

In the earlier years of our club we were using from 10 to 15 lb of short-rotation ryegrass per acre in permanent pasture mixtures and quite often we sowed temporary pure stands to provide extra winter feed. In all cases the results during the first winter and spring, after an early autumn sowing, were excellent, but in the following summer much of it died out and had to be specially managed or resown to maintain its value for high winter production.

Argentine Stem Weevil Problem

We had hoped, of course, that the new strain would be more persistent, but we were disappointed. However, in February 1959 I think we discovered the main cause of all our troubles; namely, the damage being caused to our young pastures by the Argentine stem weevil (*Hyperodes bonariensis*). It was identified for us by the Grasslands Division of the Department of Scientific and Industrial Research and since this discovery we have gained considerable experience and knowledge in developing ways and means to overcome the problem.

Short-rotation ryegrass and Italian ryegrass are particularly susceptible to damage by the Argentine stem weevil; and perennial ryegrass, cocksfoot, timothy, browntop, and Yorkshire fog are susceptible to a lesser degree. The new long-rotation ryegrass is reported to be more tolerant to attack, but of course we shall learn more about this when it becomes commercially available.

The main damage is caused by the larvae of the weevil tunnelling into and down the stems of the plant, causing death to the tillers and ultimately death or severe damage to the whole plant.

The weevils produce two distinct generations during the season and I am of the opinion that in our district they produce at least three generations.

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The first generation of larvae appear from October onwards, but do not as a rule cause severe damage, but the beetle population is built up sufficiently to produce a much greater infestation of larvae in the second generation from January onwards and causes severe damage to the susceptible grasses. The multiplication of a third generation is, of course, all the more devastating.

We have subsequently found that the Argentine stem weevil has caused much damage to pasture throughout the whole of Taranaki, and similar damage has been reported in many other parts of the country. The weevils can frequently be found in both young and old pastures which contain a high proportion of short-rotation ryegrass.

It seems to me that short-rotation ryegrass attracts a large infestation of weevils in the first place, which subsequently attack most of the other grasses of a permanent pasture, leaving the clovers to take complete charge and finally smother out the surviving grasses.

We have tried the various methods of chemical control that have been recommended, but without success, and we have tried various methods of managerial control, with limited success. No really practical, satisfactory means of control has been developed and we have been forced to seek other ways of getting round the' problem.

In brief, the method of approach which is giving us the most promising results in this respect has been by changing the composition of the seed mixtures for new pasture. In many permanent or semi-permanent pastures the amount of short-rotation ryegrass seed has been reduced to not more than 5 lb per acre or eliminated altogether, and as a result we have experienced a big reduction in damage caused by the weevil.

However, this has also reduced the winter growth potential of these pastures and since, in our experience, prairie grass has been noticeably non-susceptible to weevil damage, we have 'been interested in it as a possible substitute.

Prairie Grass as a Substitute

Prairie grass has been regularly sown by some dairy farmers in the district for many years and is a very common volunteer in many older pastures, especially in areas of high fertility, such as along hedgerows, around gateways, water troughs, old stack sites, and unharrowed dung patches. It is also common on some less fertile areas such as on roadsides and other waste land. We have been acutely aware too of the fact that very little experimental work has been done on prairie grass in this country. It would

seem that no plant breeding selection work has been undertaken, no certified seed is available, and no official identification of various strains is available.

In fact, the seed available through the trade might come from a local source or from overseas.

In recent years about 20 tons of seed a year has been imported from Australia (the actual amount is difficult to ascertain). Home produced seed comes mainly from Canterbury and Hawke's Bay from a few farmers who specialise in growing it for seed; on the other hand, I have heard that it is not uncommon for it to be harvested from roadsides and other waste areas. **You must therefore take into account such factors as unknown strains and type when you criticise its weaknesses or ruthlessly compare it with other grasses of pedigree strain which have been improved and specially selected for type over a long period.**

In 1961 the production of machine-dressed seed in New Zealand was 49,500 lb, but the annual average from 1957 to 1961 was just over 28,000 lb. Most of this was harvested in Canterbury and some in Hawke's Bay.

Apparently, in the past, a sowing rate of up to 70 lb of prairie grass per acre was recommended as a special-purpose pasture, but at today's cost this could be very expensive. Some people also contend that prairie grass is useless in a pasture mixture containing ryegrass. However, we have preferred to keep an open mind on the matter and we have progressively tried out a combination of grasses with prairie grass on dairy farms in south Taranaki.

We have not tried to establish these as special-purpose pastures, but as pastures that should play their full part in the normal grazing rotation of a dairy herd.

Members in the group now have over 300 acres of pasture sown during the past three years containing prairie grass. In addition we have been able to observe other areas that have been sown by some farmers for many years.

We have tried out several combinations and seeding rates, all on a paddock scale basis, without going to extremes, and in this way I feel a group of farmers in a club such as ours can find out what is likely to give them the best results with the minimum risk of failure or loss of production. Our members, after all, are practical farmers and not experimentalists.

Establishment

The combination which seems to be showing the best all-round results today is a seed mixture containing prairie grass 15 lb, cocksfoot 4 lb, timothy 2 lb, white clover 2 to 3 lb, perennial ryegrass 6 lb and short-rotation ryegrass 3 lb; about 32 lb per acre.

This is established in a firm, clean seed bed by drilling the prairie grass and broadcasting the small seeds, either in the same operation or subsequently with a roller drill. However, I must say that circumstances and equipment available often differ from one farm to another; hence we see some variations from time to time.

Prairie grass is a large seed and is unfortunately often difficult to sow through some machines; nevertheless, after seeing many paddocks sown by broadcasting the seed on the surface and then **discing** or harrowing it in, I am firmly convinced that drilling the seed evenly about 2 in. deep is the most successful method.

The prairie grass is the first grass to strike and its quick, upright growth soon makes a canopy to shelter the slower establishing grasses without smothering them.

When the prairie grass is ready for its first grazing it usually provides enough feed for a good bite without having to overgraze or damage the slower growing grasses. After grazing, it quickly bolts away again, continuing to produce heavily and shelter the young cocksfoot, timothy, and white clover plants.

As we have been learning more about the establishment and management of these pastures we have gradually increased the seeding rate of prairie grass and reduced the seeding rate of the ryegrasses.

The reason for retaining some **ryegrass** in the mixture has been mainly to give a light overall cover to the floor of the pasture, thus preventing the otherwise easy ingress of less productive volunteer grasses, particularly Yorkshire fog and *Poa* species.

The ingress of other general weeds is no real problem, as most of these can be killed in the seedling stage with butyric hormones without causing any damage to the young clovers. It is most advisable to do this within three months after sowing or as soon as there is complete ground cover. There is no doubt that prairie grass, like other high-producing grasses, thrives best under conditions of high fertility, and it certainly seems to respond to good fertility management.

We have been getting good results after a light pre-cropping programme and a fertiliser dressing at sowing time of 3 to 4 cwt of DDT potassic superphosphate per acre (contains 20 per cent muriate of potash, 80 per cent serpentine superphosphate, and 2 lb of 100 per cent p.p.i. DDT).

This is followed by a topdressing of 3 to 4 cwt of blood and bone per acre in the spring and then topdressing each autumn with an average of 4 to 5 cwt of 20 per cent or 33 1/3 per cent of potassic superphosphate per acre. It also responds well to liquid manure where this can be applied.

Grazing Management

The grazing management of a pasture containing prairie grass must be such that until a strain of prairie grass having a shorter sheath is developed it must not be grazed as short as ryegrass pastures.

This is the most important factor that farmers must quickly appreciate if they want to get the best results. In fact, it should not be grazed below 3 to 4 in. or below the top of the average sheath length. This does not mean that less grass is actually harvested by the stock during the rotation; on the contrary, more feed is produced in the long run, because the prairie grass and other associated grasses will grow more leaf and recovery is three to four times quicker.

I am, however, well aware of the temptation to overgraze such a pasture during a feed shortage, and sometimes this becomes unavoidable.

We have found it desirable to take a light crop of hay in the first year, late enough to ensure that the prairie grass seed is ripe at cutting time. Shedded seed will help to thicken up the pasture for extra production during the following winter and spring, and the seed that will be shed around the farm when the hay is fed out will also help to spread its usage.

We have successfully established prairie grass by underdrilling in the autumn, mainly into ryegrass areas that have been damaged by the Argentine stem weevil, and then taking a light hay crop in the following summer. One farm in the group has successfully established prairie grass and white clover alone, and I can give you some interesting information on this.

The paddock of five acres was sown down in the autumn of 1960 at 25 lb of prairie grass and 3 lb of white clover per acre. It established very well and produced a bulk of green feed during its first winter and spring. However, by October 1960 it had been subjected to overgrazing during a dry spell and became very open. This allowed a lot of *Poa annua*, Yorkshire fog, and other volunteer grasses to come in. It was closed in late November for hay and unavoidably was not harvested until late January. It was cut with the flail harvester and yielded 116 bales per acre or about four tons of very good prairie-white clover hay. A quick aftermath followed, giving good autumn production, and the reseeding effects were most noticeable. There was no sign at any stage of damage being caused by the Argentine stem weevil.

In early May 1961 it was closed for winter grass, and feeding off started on 15 July. It was subsequently continuously break-grazed by an average of 30 dairy cows (Friesians) for 24 days.

The average area grazed was about a fifth of an acre per day or, if you like, the equivalent of 145 cows per acre a day. It at least gives some idea of the quantity of bulk greenfeed it actually produced over the period.

This farmer has since expressed regret that he did not control the back grazing, because the back-grazed area became overgrazed and was very slow in recovering compared with the final grazings which were not overgrazed and recovered three or four times as fast.

Local Trials

At the Waimate West Demonstration Farm at Manaia special-purpose pastures of prairie grass, cocksfoot, and white clover have been very successful. The sowing rate was prairie 25 lb, cocksfoot 6 lb, and white clover 2 lb. These pastures have given very good production in the early spring from the prairie grass and excellent summer growth from cocksfoot, but one should not expect too much from this type of special-purpose pasture in the first year.

At Waimate they have also compared various sowing rates of prairie and cocksfoot. Prairie grass was sown at 20, 25, 30, and 3.5 lb per acre, with cocksfoot at 5, 6, 7, and 8 lb respectively, plus 2 lb of white clover. Except for a slight openness in the sward at the lower rates there was no difference between them after 12 months.

Conclusions

All the farmers who have grown prairie grass in the group have been pleased with its production and the consensus of opinion among them is that if this grass can be improved by selection and certification and could be grown for seed on a larger scale in New Zealand; wider use could be made of it by farmers, and no doubt the present high costs of the seed could be reduced.

If through selection and breeding a high-producing prairie grass type having a much shorter sheath and possibly stooling out lower from the crown could be developed, this could be an improvement from a grazing management point of view. There is also a very noticeable variation in prairie grass plants.

Some seem to run to seed at any time of the year, even in mid-winter; some have exceptionally long sheaths, others comparatively short ones; some plants stool out low from the crown and others grow very erect.

Although it is generally claimed that prairie grass will not stand hard grazing, I have noticed that in lawns many volunteer plants seem to persist after regular hard mowing. These plants have low crowns and stood out thickly and I have often wondered if such plants also stand up to harder grazing by cattle and sheep.