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# A COMPARISON BETWEEN NEW ZEALAND AND IMPORTED STRAINS OF COCKSFOOT

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Recent importations of cocksfoot seed have led to discussions on the relative merits of the strains available for import and both merchants and farmers have been inquiring for information on the expected, performance of the imported strains when sown in pasture mixtures in this country. Also the New Zealand growers of cocksfoot seed are anxious to know in what way the imported strains resemble our New Zealand Certified types. Possibly the information to be given below will answer some of these questions.

During 1950-53 approximately 785 tons of cocksfoot seed were imported. Most of this was required for the sowing down of large areas of newly developed pumice country in the centre of the North Island at a time when there was insufficient seed of New Zealand origin available on the local markets. Of the total importations 6 per cent. was of Danish origin and all the rest came from the United Kingdom.

It is a regular procedure for us to include overseas strains of cocksfoots in our plot and row trials at Grasslands Division. From observations on these in recent years together with those from earlier years it was obvious to those people responsible for the importations that any imports from the United Kingdom should be restricted to Certified seed grown from the Welsh. Plant Breeding Station's selections. There were three different selections available: the S.37 hay strain; S.26 pasture-hay strain; and the S.143 pasture strain.

Briefly the characteristics of these are as follows:

**S.37 hay strain, (1)** : An erect, leafy hay type slightly later flowering than Danish; intended for hay cuts, but can be grazed; regarded as less persistent than S.26 or S.143.

**S.26 pasture-hay strain** : Leafy, semi-prostrate type ; essentially a 'grazing type, but also giving good crops of leafy hay ; in pasture giving a good sward of marked persistency,; later flowering, more leafy, more persistent, and tillering more freely than Danish and other commercial types.

**S.143 pasture strain** : Leafy, semi-prostrate type ; leaves broad and palatable; plants relatively prostrate and spreading to grow as a densely tillered cushion; a more extreme pasture type than S.26 and intended for hard grazing.

In 1949 at Palmerston North we laid down a measurement trial to compare these Welsh selections with cocksfoots of New Zealand origin. There were six replications of the following strains included in this trial :-

Certified cocksfoot

(Akaroa strain) Aber. S.37 hay strain  
Grasslands strain (2) Aber. S.26 pasture-hay strain.  
N.Z. C.23 strain Aber. S.143 pasture strain.

Each cocksfoot strain was sown at 25lb. per acre with '31b. per acre of Certified pedigree white clover and 5lb. per acre of a poor type of Italian ryegrass.



General view of trial. Left: Welsh S.26 pasture-hay strain.  
Right: Grasslands strain.

which provided the necessary cover during the establishment stages and then died out, leaving a cocksfoot-white clover pasture.

The trial was sown on 31/3/49 and lightly grazed for eight months before the first measurements were taken. Cuts were then made at intervals according to the height of growth. The aim was to cut at the 8 to 9 in. stage. After each cut there was made a return of artificial fertiliser proportional to the yield from each plot (3). At each time of cutting green weights were recorded and samples of herbage were taken from each plot for botanical analysis and dry matter determinations. The trial extended over 33 years. The average annual yields for each pasture mixture and for the cocksfoot, white clover, and "other species" as components of each mixture are given in Table 1.

These figures show that the highest total yields were obtained from the Grasslands and Akaroa plots and when the yields were statistically analysed these proved to be significantly higher than the total yields from any other strain. Nevertheless the total yields of grass plus clover for all plots were quite high. The lowest total dry matter yield, that from the plots of S.143 cocksfoot plus white clover, was an average of approximately 15,360 lb. of dry matter per annum.

An examination of the cocksfoot component of the mixture shows that the highest yields of cocksfoot only came from the Grasslands and Akaroa plots. These were distinctly superior to the other strains in this trial. The yields of cocksfoot from the Welsh strains and the C.23 were not significantly different.

The white clover content tended to be in inverse proportion to the cocksfoot yield. The yield of white clover was the lowest in the Grasslands plots, which have already been shown to have the greatest growth of grass, and inversely there was most clover in the plot with least cocksfoot (S.143).

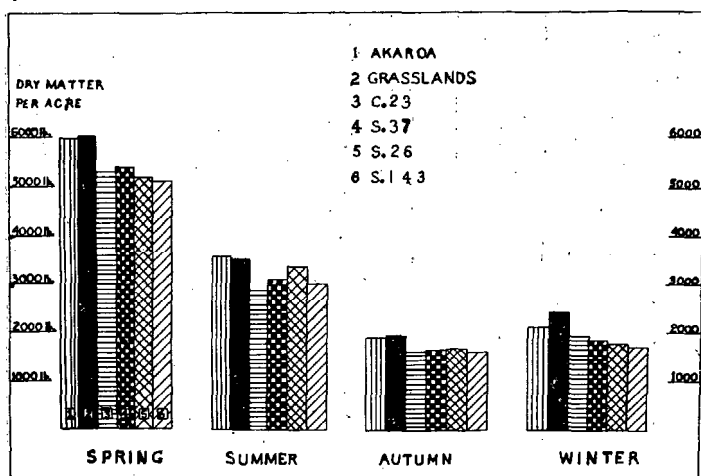
The "other species", which consisted at first of a small amount of Italian ryegrass and later of common pasture weeds such as *Poa annua* and docks, also varied according to the density of the cocksfoot-white clover mixture. The weed content was greatest in the C.23 plots and least in the S.26 and Akaroa series. The S.26 plots were relatively strong in white clover and in the Akaroa plots both the cocksfoot and clover

growth were vigorous. No doubt the competition from the good growth of both grass and clover prevented excessive weed growth.

A better appreciation of the relative merits of the cocksfoot strains as such can be obtained from an analysis of the growth made in each season of the year. These results from the experiment under discussion are given in table II and as a graph.

In the spring both the Grasslands and Akaroa were significantly better than all other strains.

In the summer C.23 was the poorest. Each of the others was relatively good and again the most production came from the Grasslands and Akaroa strains.



Average seasonal production of six cocksfoot strains.

Both Grasslands and Akaroa were superior to all others in March-May. The winter yield from the Grasslands selection was significantly better than that from any of the other strains. There was appreciably less winter growth from the Akaroa and C.23 strains, but each of the New Zealand samples was capable of more winter growth than was obtained from the imported selections.

These results agree with other trials in which the new cocksfoot strain has shown superiority, especially in the late winter and early spring. A feature of the trial as a whole has been the relatively high production of dry matter from a simple mixture of cocksfoot and white clover when grown under high fertility con-

TABLE I. Average Annual Production (34-year period) Yield in lb. dry matter per acre.

	Total Grass plus Clover	Total Relative to Grasslands = 100.	Cocksfoot	Cocksfoot Relative to G'lands = 100	White clover	White clover Relative to G'lands = 100	Other Species	Other Species Relative to G'lands = 100
Grasslands strain ..	16,382	100	13,560	100	1870	100	952	100
N.Z. Certified ( Akaroa strain) . . . . .	16,520	101	13,326	97	2322	124	872	91
N.Z., C. 23 .. .	15,457	95	11,544	85	2370	127	1543	162
S. 37 hay .. ..	15,893	98	11,908	88	2687	144	1298	136
S. 26 pasture-hay ..	15,410	94	11,838	87	2850	153	722	76
S. 143 vasture .. .	15,358	94	11,251	84	2977	159	1130	118

TABLE II. Average Seasonal Production of Cocksfoot Strains in lb. dry matter per acre.

	Spring	Relative to G'lands = 100	Summer	Relative to G'lands = 100	Autumn	Relative to G'lands = 100	Winter	Relative to G'lands = 100
Grasslands strain ..	6017	100	3547	100	1982	100	2430	100
N.Z. Certified ( Akaroa strain) .. ..	5990	99	3608	102	1937	98	2163	89
N.Z. C. 23 . . . . .	5317	88	2945	83	1647	83	2027	84
S. 37 hay . . . . .	5464	90	3216	90	1677	84	1906	79
S. 26. pasture-hay . .	5199	86	3390	94	1703	86	1822	75
S. 143 pasture .. .	5149	85	3064	85	1603	85	1754	72

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ditions. Although these figures were obtained under defoliation by cutting with a sickle bar mower knife, a grazing trial using the new cocksfoot was run in conjunction with this trial and grazed off whenever this other trial was cut. The total yields, the seasonal production, and the composition of the pastures showed very close agreement, except that under grazing there were fewer weeds and the winter recovery of growth was slightly below that from the mown trial.

The only comparison of recently imported Danish seed has been by the inclusion of plants from these lines in a single plant trial. There were some 16 lines, representing direct importations, together with samples of several named varieties which had been forwarded direct from Danish seed firms.

In all previous trials Danish cocksfoots have shown themselves to be broad-leaved, tall-growing plants relatively winter dormant and subject to frost-burn. In the spring they grew quickly, but the tendency was to run up to an early flowering and seed setting. Persistency under grazing was not good.

Our conclusions from this latest trial are that although the Danish "Adefa" and "Daeno" strains were more leafy than the rest, all the other lines from Denmark were of a type no better than the importations of 25 years ago.

To return now to the results from the production measurement trial, the figures have shown that the Grasslands and Akaroa cocksfoots were potentially, high yielders and were superior to all other strains in this trial. The yields from the other strains were quite good, but the New Zealand ones were superior to the imported strains, particularly in late winter and early spring. Persistency was good in all plots at Palmerston North. Measurement trials at Gore and observational trials at Lincoln (4) have followed a similar pattern of results, except that at Gore the S.37 strain has not persisted as well as the others.

The conclusions from these trials are that when cocksfoot seed is to be included in the pasture mixture every endeavour should be made to obtain New Zealand Certified seed, and as it becomes available full use should be made of the new selection. When there is not sufficient New Zealand grown seed of pedigree origin any one of the three Welsh Plant Breeding Station's

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selections would provide a substitute which could be expected to combine well with the other species in a normal permanent pasture sowing.

#### REFERENCES

1. T. J. Jenkins (1943), Aberystwyth strains of grasses and clovers. *J. Min. Agr.*, Vol. 50; No. 8.
2. L. Corkill (1954), A new cocksfoot. *N.Z. J. Agr.*, Vol. 89, No. 5.
3. A. J. McNeur (1953), Pasture measurement techniques as applied to strain testing. *Proc. 15th Conf., N.Z. Grassland Assn.*, 1953.
4. L. W. Gorman and J. P. Lambert (1943), The Grasslands Division substation at Lincoln. *N.Z. J. Sci. and Tech.*, Vol. 25, Sec. A, No. 2.

#### DISCUSSION

- Q. What is the food value of cocksfoot compared with other grasses?
- A. There are no very great differences at the fresh growing stage.
- Dr. Melville: We have done analysis for plant constituents, but we still do not know the food value of the constituents.
- Q. Is there any type of cocksfoot with a low-setting crown that can be used in association with lucerne?
- A. There are several types of cocksfoot that, close grazed, would be low-crowned plants.