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"PROBLEMS OF DAIRY-PASTURE FEED SUPPLY"

b y

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The remarks I have to make refer almost entirely to North Island dairying conditions. New Zealand is almost unique among dairying countries in relying wholly on pasture growth for her dairy production and in the short time allotted I propose briefly to survey some of the developments which have made such reliance possible and the relationship between these developments and the level of dairy production.

The old adage says that "half the breed goes down the throat" and this is certainly true of dairy production which is the resultant of both breeding and adequate feeding. Breeding becomes more important as the herd average rises, but so also does feeding since high production can only be achieved when nutrition is kept on a uniformly high plane throughout the year. There are grounds for believing that the production potential of our dairy herds has altered very little in the past 20 years. The increase from an average production of 173 lbs. per cow in 1916 to 238 lbs. in 1940 has been due partly to a rapid swing towards the lighter higher-testing Jersey but mainly to improved nutrition through development of our pastures.

The production of an adequate feed supply from pasture depends on the inter-action of a constellation of factors including soil, climate, the composition of the sward and particularly the strain of pasture plants composing it, the addition of soil amendments through topdressing, conservation of seasonal surpluses as hay or silage and, most important of all, the management factor which exerts so large an influence on the final result. Changes in the technique of grassland management have been rapid in the past 20 years.

During the developmental phase of the dairy industry cropping was carried out to a certain extent, in part as a preparation for sowing to grass, in part because farmers still clung to the traditional methods of the Old Country and partly because a technique for utilizing the full potentialities to grassland had not been developed. Gradually, however, as it was found that deterioration in swards could not only be arrested but that marked improvement followed topdressing with phosphates, the practice of growing supplementary crops declined, and was replaced by conservation of surplus spring and summer production as hay and silage.

As shown in this graph in the 25 years since 1915-16 the total area in sown grass in the Dominion has increased by 20%. During the same period the area in tussock grassland has contracted by 15%, the area devoted to turnips and swedes and to mangolds has contracted by 30% while the area in green fodder (rape and kale) has fluctuated considerably and is at present 5% below the 1915-16 level. On the other hand, the area of hay and silage saved has increased over 5 times. No data on topdressing was collected until 1926 but since then the area treated has trebled. Since 1915-16 the total number of cows has increased by 160% but sheep numbers by only 25%. If we convert all cattle to sheep units our pastures have over the period increased in carrying capacity by approximately 46%. This is not the whole story, however, because production per animal has also increased. Stock numbers on hill and native pastures have been stationary or even declined somewhat due to deterioration of pastures and the increase in the total number of stock carried has been concentrated on the better quality lowland pastures where top-

dressing could be carried out.

The graph also shows total production of butterfat and total production of sheep products (mutton, lamb and wool) in relation to area topdressed and area of hay and silage conserved. The two outstanding points about the graph are that first of all it shows that in spite of a drop of 30% in the area topdressed during the depression there was no corresponding fall in production, in fact, butterfat and total sheep products both rose steeply while the area being topdressed declined and after the upward trend of topdressing had been resumed in 1934 there is no corresponding rise in production. Secondly, it shows the very close correspondence between butterfat production and the area saved for hay and silage. One would expect that most hay and silage would be saved in a good dairying year but this is not the case - in fact, the hay and silage curve seems to foreshadow the trend of the following year's dairy production. It certainly seems as though provision of winter feed may be even more important than lavish topdressing in increasing production. If production falls off in this and following seasons during the war it may be due as much to lack of labour curtailing saving of hay and silage as to fertiliser rationing.

There are also interesting district differences to be observed as shown in this table which takes the three main dairying areas, North of Auckland, South Auckland and Taranaki, and sets out selected data for the years 1922-23 (the first year in which detailed information is available), 1929-30 and 1939-40.

	Sown Grass. Thousand Acres.	Hay & Silage saved. Thousand Acres.	Area Topdressed. Thousand Acres.	No. of dairy Cows 1000.	No. of cows per 1000 acres of sown grass.	Acres hay & Silage per 1,000 cows.	Acres of supplementary crops per 1,000 cows.	% sown grass topdressed.	Av. prod. per cow of all cows under test. (3 yr. moving averages.)
<u>1922-23</u>									
North of Auck.	1211	2	-	130	115	15	78	-	207
South Auckland	2270	66	-	357	157	184	234	-	220
Taranaki	1088	28	-	183	168	153	173	-	254
TOTAL	4569	96	-	670	147	143	186	-	
<u>1929-30</u>									
North of Auck.	1361	18	257	161	118	111	28	19	227
South Auckland	2507	184	1097	500	199	368	82	44	247
Taranaki	1038	60	331	198	190	303	110	33	267
TOTAL	4906	262	1685	859	175	304	78	34	
<u>1939-40</u>									
North of Auck.	1449	41	451	265	183	154	15	31	237
South Auckland	2735	262	1553	729	267	359	50	57	256
Taranaki	949	84	424	240	253	350	52	45	276
TOTAL	5133	387	2428	1234	240	313	43	47	

Incr. % over
1922/3 for 3
districts

12 303 44* 84 63 119 -77 38

* 10 yrs. period.

Taranaki was earlier developed than the other two districts and the area in sown grass has actually contracted by 139,000 acres in the last 17 years while it has increased by 238,000 acres in North Auckland, and 465,000 acres in South Auckland. The total sown grass in the three districts has increased by 12% during the period while cow numbers have increased by 84%. After making allowance for the increased area involved the number of cows carried per 1000 acres of sown grass has increased by 63%.

The area of hay and silage saved has increased markedly, particularly prior to 1930. The area saved per 1000 cows more than doubled in the 7 years before 1930 but has increased very slightly in the last 10 years. North Auckland still lags very markedly behind the other two districts in provision of hay and silage per cow. I think this is merely because North Auckland is in an earlier phase of development than the other two districts. You will note, for instance, that the area of hay and silage saved in North Auckland is increasing very rapidly and in 1940 reached the same figure as applied to Taranaki in 1923. Perhaps, too, the North Auckland farmer has been reluctant to relinquish the idea that paspalum makes good "Natural hay" for wintering his stock. The provision of supplementary crops (turnips and swedes, rape and kale, green-feed, etc.) per cow has declined by 77%. The smaller proportion of grassland topdressed and the smaller area saved for hay and silage per cow in North Auckland is reflected in lower per-cow production.

It is not possible in twenty minutes to deal with grassland developments in any systematic way and I propose to merely touch on several further problems of particular moment.

It had been recognised for many years that pasture seeds from certain districts were of superior quality and in 1929 the certification scheme was introduced and provided the necessary machinery to assure to buyers that seed was true to type and of a superior strain. You are all aware of how this work has been followed up by Mr. Levy and his staff in selecting still higher producing strains and gradually incorporating these into the certification system. In view of the very real merit of these strains and especially their superiority in persistency, seasonal spread of production, etc., one is inclined unconsciously perhaps to credit them with a considerable share in the increased production which has been observed. There is no record of the extent to which certified seeds have been used in sowings but in the period 1931-40, 450,000 acres of virgin land and 667,000 acres previously cultivated were sown to pasture in North Auckland, Auckland and Taranaki Land Districts.

Estimate of Area sown with Certified Perennial Rye in North Auckland, Auckland and Taranaki Land Districts in the period 1931-1940.

Year.	NEW PASTURE SOWN.			PERENNIAL RYE HARVESTED*			Area sown certified seed. Thousand Acres.
	Virgin Thousand	Previously Cultivated Acres.	Total	Total	Certified Thous. lbs.	% certified.	
1930/31	62	61	123	9922	341	3.4	4.18
/32	57	74	131	13221	919	6.9	9.04
/33	51	64	115	7652	1623	21.2	24.40
/34	41	67	108	26242	4913	18.7	20.20
/35	41	76	117	12660	2380	18.6	21.76
/36	38	72	110	17117	3647	21.3	23.43
/37	39	69	108	19473	5586	28.7	30.99
/38	40	62	102	6387	2589	40.5	41.30
/39	42	68	110	8407	3794	45.1	49.60
/40	39	54	93	12773	4593	36.00	35.50
TOTALS	450	667	1117	133,854	30385	22.70	258.40

Total area in sown grass - 5,133,000 acres.

* Harvest figures refer to previous season and are the amounts available from the previous year's harvest for sowing in year shown.

Assuming that "certified" perennial rye was used for sowing in the same proportion as it bore to the total harvest in the previous season would mean that some 258,400 acres have been sown with "certified" rye during this period. Or in other words, at the present time 5% of the total area of sown grass in these districts has been laid down with "certified" seeds. One is reluctantly forced to the conclusion that to date the improved strains of pasture plants available have made little direct contribution to increased carrying capacity in the dairying districts and that at the present rate of pasture replacement (1.3% per annum) it will take many years to obtain measurable benefits. It should be added, however, that long before we heard about "certification" many pastures were sown with good types of rye from Poverty and Hawke's Bay and these have responded well to topdressing and improved systems of management. Also the certification scheme apart from its direct benefits has helped to make farmers "strain-conscious" and has favourably influenced the general quality of seeds even outside the scheme. It is disappointing, however, that we have not made more progress in utilising the improved strains now available.

A very large increase in the area of hay and silage saved has occurred but the scope for further increase is still very great. In an average season over 50% of pasture production occurs in the period October-December while only 30% of the feed requirements of a dairy herd fall in the same period. In other words 40% of grass production in this period is surplus to herd requirements. In actual practice approximately 17% of the area used for dairying was saved for hay or silage in South Auckland in 1939-40 and 16% in Taranaki but only 7% North of Auckland. While it may not be possible to achieve the ideal of 40% of the area saved each year there is obvious scope for improvement in North Auckland and for a further increase in other areas.

In spite of our natural advantages, complete reliance on pasture growth would hardly have been possible had it not been that the efficiency of modern refrigeration, by smoothing supplies to the market, allowed seasonal production to be adopted. The seasonal curve of dairy production follows very closely the curve of pasture production but lack of adequate feeding is still a limiting factor to production in over 50% of our herds which fail to reach 240 lbs. fat per cow. Dry spells in January-February frequently decrease production and many cows are inadequately fed during the winter months. Districts such as Taranaki, with a high average production per cow are notable for the way in which they maintain production in the autumn and for the longer lactation they achieve.

Various methods of overcoming weaknesses in the system of complete dependence on pasture, such as topdressing, saving of hay and silage, use of improved pasture strains giving greater production and better seasonal spread and the use of autumn grown grass "cool-stored" through the winter have been adopted with considerable success though there is great scope for further extension in these directions. In our efforts to reduce demands on labour and capital, however, have we become too dependent on grass. Even from a grassland point of view would it not be profitable to plow our permanent swards at longish intervals, take one or perhaps two supplementary crops to provide succulent feed for autumn or winter feed subsequently resowing with the improved strains of grasses and clovers now available. Lack of necessary equipment is a limiting factor to any such development at the moment but if a small general-purpose tractor of low first cost were available, and I believe it will be available after the war, this difficulty might be overcome with benefit both to our total stock carrying capacity and the uniformity of seasonal supply.

We have no reason to be satisfied with things as they are. Mr. Madden's survey of North Island pastures showed that only 0.65% of our grasslands are first class rye white pastures. Conceding a more liberal interpretation of a good sward so as to embrace Madden's types 1-3 still includes only 14% of our total grassland in the North Island as of first class quality. It has been amply demonstrated that even on the poor gumlands of the North and the light pumice soils found Rotorua good high producing pastures can be profitably established and maintained. There is a tremendous reservoir of potential production in our pastures as yet scarcely tapped.

Briefly, to summarise, the main points I have tried to make are:-

1. In the last 25 years the carrying capacity of our pastures has been increased by approximately 46%.
2. The area topdressed declined by 30% during the depression but was accompanied by no corresponding decline in production. Since 1933 the area topdressed has more than doubled without any corresponding increase in production.
3. There appears to be a very close association between the area saved for hay and silage and dairy production in the subsequent season. If dairy production falls off during the war it may be due to lack of labour curtailing the saving of hay and silage rather than to fertiliser rationing.
4. Provision of supplementary crops per cow has declined by 77% over the past 25 years.
5. The improved strains of grasses and clovers available have made little contribution to the increased carrying capacity of our pastures. It is estimated that only some 5% of pastures in the dairying areas have been sown with certified perennial ryegrass.
6. Approximately 17% of the area used for dairying was saved for hay and silage in South Auckland in 1939-40 and 16% in Taranaki but only 7% in North Auckland. Theoretically 40% of the feed produced at this period is surplus to requirements and might be conserved.
7. The suggestion is put forward that there is a case for adopting a form of long-ley farming with its opportunity for providing a better sustained supply of feed for our dairy-stock and at the same time providing an opportunity to resow our pastures with the improved high producing strains now available.

DISCUSSION

MR. HOLFORD: As a suggested reason for the non-decline of farm production over the period of reduced manuring, it may be pointed out that this coincided with a marked increase in better pasture, management methods. In regard to heavier manuring over a certain period not being reflected in greater stock carrying capacity, the manuring may have prevented a decline in such capacity.

Owing to limited areas of cropping on many dairy farms, a system of contract work whereby cultivation, seeding, etc., could be done on a number of farms by a contracting unit, might be desirable on a more extensive scale than at present. This is developing in Britain. Such a system would also help in hay conservation - all too little being saved at present in many areas.