SOME FARMING TRENDS IN WHANGAREI COUNTY

1940-41 TO 1946-47

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THE results of the survey of Whangarei County by Dr. W. M. Hamilton are at present awaiting publication. This work was based on the 1940-41 season and dealt with all farming land within the county.

In order to gain an estimate of the reliability of the results of a survey based on only one season and to assess what trends were occurring on individual farms, a fairly large sample of farms was taken out. The total sample was as follows:—

(a) A randomly selected group of 200 of the 510 dairy farms on which the whole of the area utilised for farming was plowable.
(b) A similarly selected group of 60 of the 176 farms running both dairy cows and sheep.
(c) 78 sheep farms.
(d) 15 dairy farms for which the whole of the area utilised is unplowable.

The two latter groups included all farms for which satisfactory data were initially available.

We now have information for seven seasons, i.e. 1940-41 to 1946-47, and it is proposed to present a preliminary outline of some of the trends on the "all plowable" dairy farms and on the sheep farms.

For a number of farms originally chosen in the sample satisfactory data is not available for the full period. These were eliminated and the following outline is based on data from the remaining 152 "all plowable" dairy farms and 63 sheep farms.

Use of Lime and Artificial Fertiliser.

This 7-year period commenced with the last season in which phosphatic fertiliser was unrationed. There was one season with a quota of 40% of the quantity used in the base period, 1939-1941, then two seasons with a 28% quota, and subsequently a gradual rise in the fertiliser allowance. This increased supply was first made available to dairy farmers.

Figure (1) sets out the movements in—

(a) Total area topdressed with lime and/or artificial fertiliser.
(b) Area topdressed with artificial fertiliser.
(c) Area topdressed with lime.

Though the average area being topdressed on sheep farms is greater than on dairy farms, the percentage area per farm is only about one-fifth that of dairy farms. It may also be mentioned that in every season at least 90% of the dairy farmers within this sample used artificial fertiliser. The proportion of sheep farmers using it dropped to as low as 57% and was never above 68% in any one season.

Despite the reduction to a 28% quota for two seasons, the average area of the plowable dairy farms receiving artificial fertiliser fell by only 15 acres and immediately increased again when a higher quota was made available.

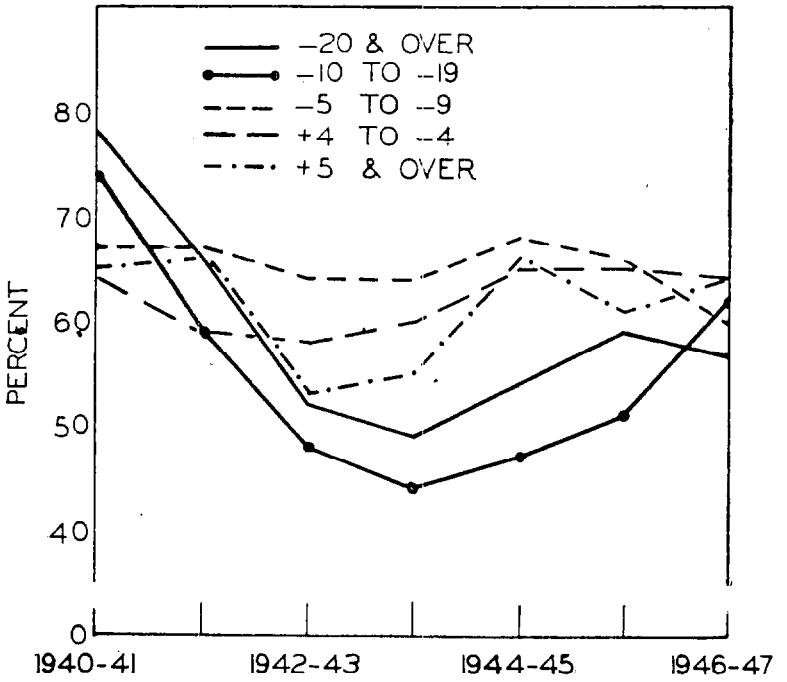

Fig. 1

On the majority of the 63 sheep farms the greater part of the area utilised is hilly land requiring hand topdressing. It would, therefore, appear reasonable to suggest that the much greater decline in average area topdressed shown by the sheep farms, i.e., from 107 to 50 acres, would be in considerable measure due to labour shortage. Some men ceased using artificial fertiliser and many others probably limited topdressing to areas easiest of access or to plowable areas on which top-dressing machines could be used.

From the above data it is obvious that for the dairy farms in particular there was not only a reduction in area topdressed, but also in the rate of application.

An attempt has been made to quantitatively assess the variations in the rate of application by 152 dairy farmers from a comparison of movements in average area topdressed with movements in gross deliveries of artificial fertiliser from the Auckland works. (Table 1.)

TABLE 1—Variations in Rate of Application of Artificial Fertiliser—152 Dairy Farms.

Season	Average Area Topdressed (One year lag).	Index of Fertiliser Deliveries from Auckland Works. (1940-41 as base 100).	Index of Rate of Application (1940-41 as base 100).
1940-41	64	100	100
1941-42	56	54	62
1942-43	55	53	62
1943-44	61	50	53
1944-45	63	64	65
1945-46	65	80	79

The assumption is made that trends in total deliveries correspond with trends in deliveries to farmers in Whangarei County. Alternative indices of quantities of fertiliser used would be:—

(a) The ration quota.
(b) Deliveries at rail stations serving the Whangarei County.

The gross quantity of artificial fertiliser used does not correspond at all closely with the level of the quota and on the second point the County has also received fertiliser deliveries through the port of Whangarei for which adequate data are not available.

The data for average area topdressed have been lagged one year in order to get closest possible agreement with the indices of fertiliser deliveries. This is because the 12-monthly period on which area topdressed is assessed terminates five months before that for Works deliveries. In addition there will frequently be a delay of a few months between date of delivery from the Works and date of application by the farmer.

As the yearly indices for rate of application are based on a number of assumptions, individual indices should not be taken as accurate. Rather, it would be better to state that the rate of application on the plowable dairy farms appeared to drop to about 60% of prerationing levels, then commenced to rise when increased quotas became available. The very low rate of application in 1943-44 is undoubtedly fictitious for this includes a few months of the season when the allocation to dairy farmers was first increased, i.e. by an extra 1 cwt. per cow in milk.

During these seven years, the area of the dairy farms receiving lime rose, but rather irregularly. The upward trend in number of dairy farmers using lime was much more even.

Among the sheep farmers, the average area limed fell slightly during the war period. This was entirely due to a substantial reduction in average area sown by those men who were actually using lime. The number of sheep farmers using it actually followed the reverse trend, i.e. increased during the war years.

63 Sheep Farms.

For three of the seven seasons sheep returns were not collected, and it is not possible to follow year to year movements in sheep stocking. These 63 sheep farms are a very heterogeneous group. There are a number of holdings with 200 sheep or less, other holdings on which Southdown rams are being used on hard hill country, as well as a few fat lamb farms on the better land and a number of several thousand acre hill country farms using predominantly Romney rams. The year to year averages for carrying capacity in terms of stock units and cattle equivalents are set out in Table 2.

Table 2—Trends in Carrying Capacity on 63 Sheep Farms in Whangarei County. Period 1940-41 to 1946-47.

Season	Sheep Stock Units Per Acre.	Cattle Stock Units Per Acre. *	Total Stock Units Per Acre.
1940-41	0.87	0.62	1.49
1941-42	—	0.61	—
1942-43	—	0.62	—
1943-44	0.83	0.69	1.52
1944-45	0.83	0.71	1.54
1945-46	—	0.70	—
1946-47	0.81	0.65	1.46

* A beef steer or beef cow equals 3.7 stock units.

Judging from the years for which data are available, the rate of sheep stocking (sheep stock units per acre) has remained fairly constant, with possibly a steady but slight downward trend. Cattle stocking rose markedly in 1943-44 ,reached a peak in the following season, and though subsequently declining was still above the 1940-41 levels in the final year of this period.

In terms of total stock units per acre, net movements have been very small. The upward trend in cattle stocking has largely cancelled out the decline in sheep stocking.

152 "All Plowable" Dairy Farms.

The yearly averages for carrying capacity and butterfat production for the whole group are set out in Table 3.

Table 3—Trends on 152 Dairy Farms in Whangarei County.

Season	Carrying Capacity (T.S.U. Per Acre.)	Number of Cows Per 100 Acres.	Butterfat Production		Production Per Cow Tested Herds in Northland Association
			Per Acre	Per Cow	
1940-41	2.54	38	115	260	252
1941-42	2.54	39	113	248	232
1942-43	2.48	39	102	222	220
1943-44	2.54	38	113	251	245
1944-45	2.59	40	114	243	244
1945-46	2.36	38	87	192	184
1946-47	2.39	36	101	231	228

(a) Carrying Capacity.

Whether it be expressed in terms of stock units per acre or number of cows in milk per 100 acres, average carrying capacity has remained fairly constant. 1944-45 was the peak year. In assessing total stock units, an allowance is made for the average butterfat production per cow of each herd in each season. This figure therefore tends to move in sympathy with level of production per cow. It rises in a good season and drops in a drought season. The response to seasonal conditions shown by the figure for number of cows in milk per 100 acres is somewhat different. Cow numbers may be reduced by early drying-off in a very bad drought, e.g., 1945-46 season, but more noticeably fall in the season succeeding a drought period, e.g., in 1943-44 and 1946-47, thus suggesting that after a drought, with winter reserves probably depleted, farmers tend to cull more heavily.

(b) Butterfat Per Cow.

The average level of production of butterfat per cow is very closely affected by seasonal conditions. The range from 260lb. per cow in 1940-41 a good season, to 192lb. per cow in 1945-46, a very severe drought season, is therefore not unexpected.

Set alongside are the Herd Improvement Association's figures for average production per cow in tested herds in the Northland Association. "At the pail" production per cow on the sample farms is slightly above that for the tested herds, but the year to year trends are almost identical.

(c) **Butterfat Per Acre.**

This shows considerable year to year variations, chiefly due to the wide fluctuations in production of butterfat per cow. Highest levels were in 1940-41, with 115lb. per acre and the lowest in 1945-46—87lb. per acre.

In Table 4 averages for the first three years, 1940-41 to 1942-43, are compared with those for the final three years, 1944-45 to 1946-47.

Table 4—152 Dairy Farms. Averages for first 3 years compared with averages for final 3 years.

	Carrying Capacity (T.S.U. Per Acre.)	Number of Cows Per 100 Acres.	Butterfat Production		Production Per Cow Tested Herds in Northland Association.
			Per Acre	Per Cow	
Average 1940-41 to 1942-43	2.52	38.7	110	243	235
Average 1944-45 to 1946-47	2.45	38.1	101	222	219
Percentage Decrease	-2.8	-1.6	-8.2	-8.7	-6.8

The movements of carrying capacity have been small. In terms of stock units a decline of 2.8%. The fall in average number of cows per 100 acres, which is chiefly due to the aftermath of the 1945-46 drought, is only 1.6%.

In contrast production per cow and per acre have declined by over 8%. How much of this is due to labour scarcity, shortage of fertiliser, and other such difficulties, and how much to seasonal influences, cannot be assessed. But remembering the severity of the 1945-46 drought, and the fact that severe drought appears to be followed by a lowering of production in the following spring, it would appear that a large portion of the decrease is due to seasonal conditions.

Trends on Individual Farms.

However, where individual farms are examined it is found that the trends have been by no means uniform.

The farms were grouped according to the differences between the first three and last three years (in average production per acre). On 41 of the total of 152 farms, there was a decline of 20 lb. or more in butterfat per acre, or, in percentage terms, an average decline of well over 20%. Yet in the same period 28 farms increased their production by 5 lb. per acre or more. The remainder of the farms were grouped fairly evenly between these two extremes. The seven year group averages for a number of factors were examined. There do not appear to be any consistent differences between the farms in terms of average area, butterfat per acre, etc.

The decline in average production per cow has been greatest (-14%) in the group in which there was the greatest fall in production per acre and least (-5%) for the group which increased production per acre by 5 lb. or over. (Table 5.) The range about the mean is not nearly as large as occurs where average trends in number of cows per 100 acres are considered. Here it varies with quite even gradation from -17% to +20%.

Table 5—Farms Grouped According to Trends in Production of Butterfat Per Acre.

Variation in Production Per Acre. *	No. of Farms	Butterfat per Cow			Cows Per 100 Acres.		
		First 3 Yrs	Final 3 Yrs	Difference %	First 3 Yrs	Final 3 Yrs	Difference %
Plus 5 lb. and over	28	243	236	−2.9%	39.1	48.3	+23.5%
Plus 4 lb. to minus 4 lb.	27	240	226	−5.8%	37.6	39.4	+4.8%
Minus 5 lb. to minus 9 lb.	27	246	225	−8.5%	44.6	45.1	+1.1%
Minus 10 lb. to minus 19 lb.	29	240	218	−9.2%	39.9	38.0	−4.8%
Minus 20 lb. and over.	41	245	211	−13.9%	50.3	41.9	−16.7%

* Period 1940-41 to 1942-43 compared with 1944-45 to 1946-47.

Still using the comparison between averages for the first three and final three years, it is found from grouping according to trends in number of cows per 100 acres, that whereas 27 farms have made increases of 6 cows or over, averaging a 27% rise, 28 farms have declined by 6 cows or over, on the average a 25% fall. The remainder of the farms are once more grouped evenly between these extremes.

Table 6—Farms Grouped According to Trends in Number of Cows Per 100 Acres.

Variation in No. of Cows per 100 acres*	Aver. Var. %	No. of Farms	Butterfat Per Acre			Butterfat Per Cow		
			First 3yrs.	Final 3yrs.	Diff. %	First 3yrs.	Final 3yrs.	Diff. %
Plus 6 and over	+27%	27	102	117	+14.7%	257	229	−10.9%
Plus 2 to plus 5	+ 9%	29	117	117	—	249	224	−10.1%
Minus 1 to plus 1	—	30	103	96	− 6.8%	241	226	− 6.2%
Minus 2 to minus 5	− 8%	39	109	91	−16.6%	241	221	− 8.3%
Minus 6 and over	−25%	27	120	85	−29.2%	228	212	− 7.1%

*Period 1940-41 to 1942-43 compared with 1944-45 to 1946-47.

The farms that have made largest increases show a slightly greater falling off in average production per cow. They may have suffered slightly more during the 1945-46 drought and its aftermath. However, the range of differences is not great and is certainly not large enough to offset the very favourable effect of the extra cows on the level of production per acre.

Where there was a decline in number of cows per 100 acres there was very little associated benefit in terms of production per cow and the decline in per acre production was, therefore, very marked and on the average proportional to the decline in cow stocking.

Now, what are the reasons for these wide variations in trends of production per acre and cows per 100 acres within such a short time. To a large extent that is a question which needs to be put to the meeting for, so far, the analysis of the data has provided, at the best, a very incomplete answer.

The trends in production of butterfat per acre do not appear to be associated with any corresponding trends in area cut for hay and silage or area limed. However, the area cut for hay on almost all the

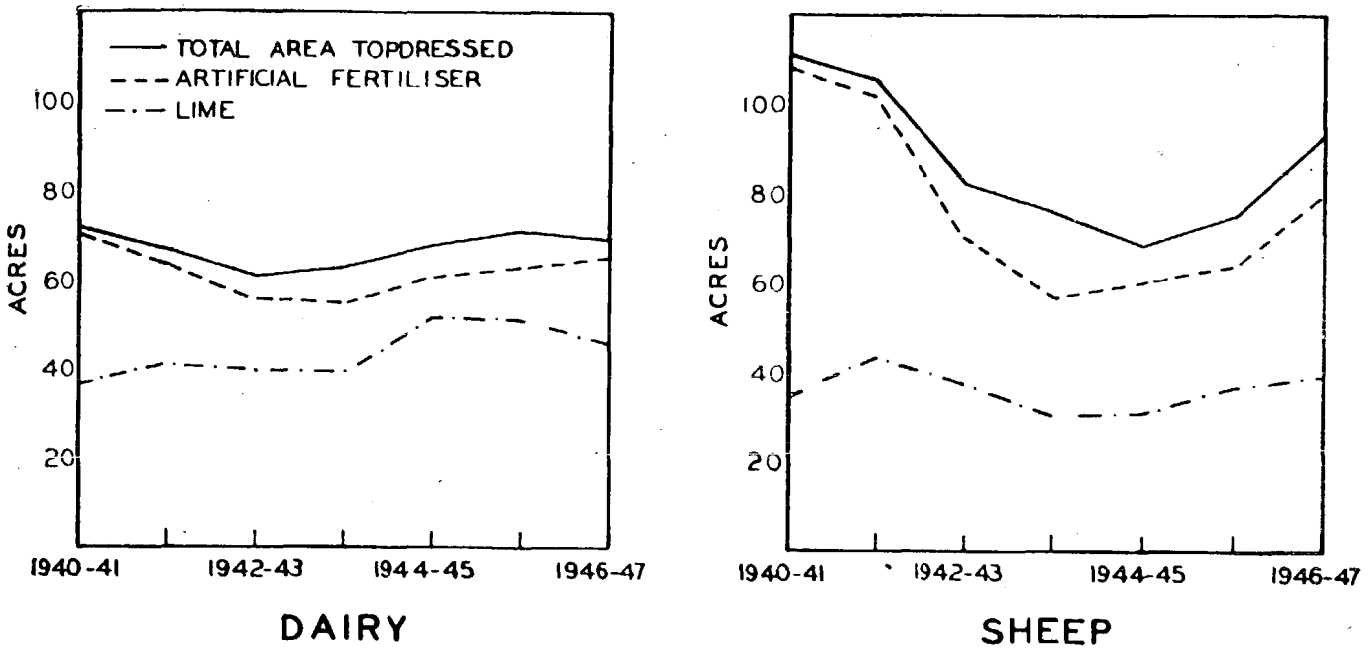
TOTAL AREA TOPDRESSED
ARTIFICIAL FERTILISER
LIME
ACRES
100
80
60
40
20
1940-41
1942-43
1944-45
1946-47
DAIRY
ACRES
100
80
60
40
20
1940-41
1942-43
1944-45
1946-47
SHEEP

Fig. 2

farms within this sample is well below what is considered desirable. On the average these farmers cut hay from only 6.9% of the farm. This provided only 6.3 cwt. per cow in milk and in no season did the average quantity reach 9 cwt. per cow. Similarly, the habit of using lime is not yet well established. The area limed on individual farms showed wide year-to-year variations and many farmers used no lime during the whole seven-year period.

Therefore, it is not suggested that the above lack of association offers any evidence that the saving of hay and silage, or use of lime, is not important. Rather that the average level of use on plowable Whangarei dairy farms is so small or erratic that the influence of trends cannot be seen.

There does appear to be an association with movements in average area topdressed per farm (Fig. 2). On those farms which have been best maintained or increased their production per acre, the average decline in area topdressed during the period of severe rationing was least. Those farms on which there was a substantial drop in production were initially topdressing a larger average area, but reduced that very substantially with the onset of fertiliser rationing.

Men who have the ability to make most improvement in butterfat production per acre could be expected to have sufficient initiative to seek extra supplies of fertiliser. However, the average range of difference and number of farms concerned are too great for this to be the whole story and we are left with the implication that, where there is a limited quantity of artificial fertiliser available, it is better to spread that over as large an area as possible rather than topdress a reduced area at fairly high rate per acre.

The association with maintenance of area topdressed cannot reasonably be held to account for more than a small proportion of the variation in production of butterfat per acre. Factors for which no data is available, or which cannot be measured, have probably been of prime importance. Such are labour supply, grazing management, and finally each farmer's reaction to the existing cost-prices structure.

Those farms which maintained or increased their production per acre despite the bad seasons have done so by increasing number of cows milked, rather than production per cow. This would emphasise the importance of combining good management practices with a fairly high rate of stocking in order to obtain most efficient utilisation of the grass which is grown. For the average dairy farm, improvements in farm practice are initially best capitalised by running more cows rather than attempting to produce more per cow.

Finally, we are left with the query—To what extent have such wide variations in production of butterfat per acre, and in carrying capacity, occurred in other dairying districts? To what extent have small average variations been making wide variations on individual farms?

Discussion on Mr. Mitchell's Paper

Dr. FILMER: I would like to ask Mr. Mitchell if he thinks that the relationship between the increase of cows per acre and increase of production per acre is in any way connected with paspalum. It is a grass that gets notoriously out of hand when it is not grazed.

Mr. MITCHELL: I would prefer to refer your question to Mr. Taylor, who is familiar with the work that has been done and is personally far more familiar with the conditions in the north than I am.

Mr. TAYLOR: It might possibly have some effect. In a normally productive season there is a tendency on the majority of farms for the paspalum to get to a rank stage and it is not fully utilised. Where the stock-carrying capacity is increased, more of the paspalum is chewed down and the autumn growth is then more satisfactory from a dairyman's point of view. That possibly is related to the trend noticed by Mr. Mitchell.

Dr. McMEEKAN: I would like to ask Mr. Mitchell whether in searching for reasons for trends of the type he has illustrated, he has ever considered the possibility of taking into account the personal farmer factor in these farm management studies. It has always seemed to me that such farm management surveys miss one of the most potent factors entering into productive efficiency of the farm, i.e., the farmer. Could not the farmer be graded by personal contact with him of people like Mr. Mitchell and Dr. Hamilton insofar as his ratings are concerned as pasture manager, shed manager and so on? Mr. Whittleston in the previous paper illustrated how important shed habits can be in affecting the production of the cow. I can assure you from my difficulties in persuading Mr. Lees, my head dairy man, to give Mr. Whittleston cattle that he is capable of affecting the production capacity of the cow. An illustration of the possible importance of this farmer factor is the fact that, with the particular farm and herd at Ruakura which we are trying to run badly, we cannot approach the low production figures that exist in the industry. In other words, could not the farmer be rated as the soil is rated, the cows are rated and the pastures are rated in Mr. Mitchell's and Dr. Hamilton's farm surveys?

Mr. MITCHELL: Before replying to Dr. McMeekan's comment, there is one point I would like to emphasise. The data we have been able to collect and attempt to assess has been obtained very largely as a co-operative effort. We have to thank the Dairy Board and its field officers, the Census and Statistics Dept., the Agricultural Dept., and various branches of our own department. There are many men helping in this.

I fully agree with Dr. McMeekan that the farmer is a most important factor. However, the essence of the technique which Dr. Hamilton has developed and which we are at present using for Whangarei and Waipa, in the Waikato, is to make maximum use of data which is already being collected. That is, we do not at any time visit the individual farmer ourselves to collect data. Therefore, though I fully agree with Dr. McMeekan's contention, with the method we are using this is not practicable. The present technique has the advantage that a county survey can be done in six months, whereas to visit each individual farm would probably take that time at least and require more staff before one even started to work on the data. The consideration of the individual is a thing which would require a new approach and further work.

Mr. THOMPSON: Whangarei is a difficult county for the approach that you have made because of the different soil types and also because of the factor that has been raised by Dr. McMeekan. If there is one part of New Zealand where, to a large extent, farmers leave that which can be done to-morrow till to-morrow, it is North Auckland and I am not going to say they do not have a very enjoyable life out of it but farming there does not give the results that it does in the Waikato and other parts. There is a lot that can be done in North Auckland and I hope that the work being carried out by Dr.Hamilton and others will show the farmers there, as a whole, what is being achieved by a number of good farmers in the district. I would like to say that the work of Dr. Hamilton and Mr. Mitchell is appreciated.

Mr. WARD: I would like to point out that, after all, this data refers to a group of farmers and therefore to farmer ability classed as a group. One particular aspect is whether there has been any substantial loss in per acre production due to reduced fertiliser topdressing and whether, as appears to be so from Mr. Mitchell's data, with a reduced amount of fertiliser it is better to spread it over the whole of the farm than to spread it over a part only. In view of Mr. Woodyear-Smith's experience with topdressing practice and grass production, would he care to comment on this matter?

Mr. WOODYEAR-SMITH: I cannot give accurate data about that. The position is rather involved because some of the farmers in the Whangarei County have a run-off and milk their herds on their farms during the lactation season and then without saving any hay or silage turn their cows out on to the hilly country with rough food for the winter. In the areas where the farmers are milking, portions of the farms only are topdressed normally once every three or four years, so it would be extremely difficult for me to say anything definite about it.

Mr. MITCHELL: It may be of some interest to Mr. Ward that Dr. Hamilton selected Whangarei County partly because the differences in soil type were very marked and appeared to be having a definite influence on farm productivity and that it was an area where farming was still relatively in the developmental stage. Therefore, if a technique could be devised for that County, it ought to work anywhere. The Whangarei survey is now awaiting publication.