

SOME FACTORS AFFECTING PRODUCTION ON A BAY OF PLENTY DAIRY FARM

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This paper tells something of the story of the development of a low-producing, partially developed property in the Tauranga County. It is probably representative of hundreds of farms in this area which were in this backward condition at the end of the Second World War and have been brought to a reasonable state of productivity by the present occupiers.

The property is three miles south of Katikati half way between the main road and the bush line of the Kaimai Range. It is of 202 acres, of which 150 acres is now in grass, the balance being in broken contoured bush, stony creeks, swampy watercourses (there are three miles of these on my farm), and a few acres of scrub still to be broken in. One hundred and thirty acres can be topdressed by spinner and 110 acres can be covered by forage harvester suitably modified for hill country. Steep banks left by creeks many years ago are a feature of the property.

When I bought the farm under the rehabilitation scheme in June 1946, 90 acres was in grass. Its peak production had been 8,700 lb of butterfat, but over the war years, with lack of labour and manure, it had gone back to 5,000 lb of fat.

There were 10 paddocks, no troughs, no races, the pastures were mainly solid *paspalum* with some cocksfoot, and the dominant legume was *Lotus hispidus*. The development from 6,600 to 34,000 lb of butterfat over 15 years falls-naturally into three stages. In the first stage of five years there was a fairly rapid increase in the production, from 6,600 to 17,000 lb of fat, from the existing grassland and from the breaking in of 50 acres of standing bush. The second stage of four years was a period of **arrested** progress to which overstocking with sheep, dry seasons, grass grub, insufficient phosphate, and lack of potash all contributed. The third stage of six years was one in which expert advice was taken and applied and has resulted almost in a doubling of production in that time.

Factors which I believe have affected production may be listed as follows:

1. Adequate Balanced Fertiliser and DDT

As soon as fertiliser rationing eased after the war I applied at least 3 cwt per acre of serpentine superphosphate each year, though never as much as 4 cwt per acre except for an odd paddock.

- Q. (P. D. Sears): Asked if any observations had been made of earthworm activity in soils about **pH** 5.3. His own idea was that earthworms cleaned up dung spots. He also asked whether there was any relationship between earthworm populations and liming?
- A. Mr Hewitt replied that relatively few earthworms were present in virgin soils of **pH** 5.3. He had not observed any connection between earthworms and liming. Dung spots appeared to clean up reasonably quickly due to favourable soil structure and climate.
- Q. (J. Tripp): Why was timothy not advocated for use in the Bay of Plenty?
- A. (S. R. Hewitt): It is slow to establish on ash country due to the **ryegrass** getting away too quickly. On heavier, wet country I use it more now in mixtures. If the management is good it can survive, and it has a future on pumice soils.
- Comment (Dr Sears): Timothy does very well in parts of the **Whakatane** district and therefore I consider it to be a good grass.
- Q. (Henderson): I have several acres of river flat in dominant ryegrass. How do I get clovers and paspalum back into the sward.
- A. (A. V. **Allo**) : If pastures are grazed down hard, and kept well grazed, clovers will again come into the sward. Paspalum will come in slowly and it is recommended that paspalum hay be fed out during the winter.

This continued for nine years, at the end of which production seemed to have stabilised at about 18,000 lb of butterfat plus some production from sheep.

In the ninth year I requested assistance from the Department of Agriculture and a soil test was taken of the farm. This, to quote the report, "gave a rather disturbing picture of the soil fertility of the farm"; and further on the report continued: "your property, on the basis of this soil test, really needs 6 cwt of phosphate this year and about 4 cwt per acre for the two or three years after that to bring it up to a really satisfactory level." The report also advised the application of up to 2 cwt of potash per acre on certain paddocks.

This advice was followed as far as I was able at the time. Unfortunately, to begin with, the resulting butterfat production figures did not rise as rapidly as I had hoped because of stock troubles that were indirectly induced by the combination of overstocking in the previous two years and a couple of very dry seasons. These factors reduced the herd in the next two years from 75 to 55 and thus it was not until the effects of this setback were overcome that the full benefit of the new fertiliser plan was realised.

Table I shows that the first three years of the plan were fulfilled, but in the fourth year fertiliser had to be cut back severely because of the financial stringency caused by the herd losses.

Since this fourth year I have set out to increase the fertiliser bill for the farm by 10 per cent per year in the expectation that each year's successive increase will pay for itself in increased production. I intend to continue with this plan until the soil test figures reveal that the optimum levels have been reached, when presumably the annual rate of topdressing can be reduced.

It is only during the past four years that use has been made of DDT superphosphate. I had been aware that grass grub had been very active in certain paddocks on the farm, particularly the areas newly sown out of bush scrub, but had ignored the possibility of a lesser infestation affecting the balance of the farm. Examination of the turf, however, about four years ago revealed the presence of the grubs in considerable numbers and since then, on the advice of the Department of Agriculture, I have used DDT on at least a third of the farm each year.

The ratio of contribution to the doubling of production in the last six years made by each of these three factors (that is, higher phosphate, potash, and DDT) is difficult to assess.

Taking the first two together, however, a rough and ready trial was laid down in March 1960 in which a paddock was cut into four quarters. One part received 10 cwt per acre of 30 per cent potassic superphosphate, two parts received 5 cwt per acre of the same fertiliser and one part received nothing. The paddock was closed for autumn-saved pasture in mid-April and was inspected in June. The quarter which had received 10 cwt per acre had reached the stage where grazing was urgently needed to prevent the bottom becoming "musty". The half which had received 5 cwt per acre could be classed as good autumn-saved pasture but was not in need of urgent grazing. The "nil" quarter would have made little contribution to the winter grazing of the herd.

The "nil" quarter then received 5 cwt per acre of straight superphosphate. In March 1961 the whole paddock received 6 cwt per acre of 30 per cent potassic superphosphate and was again inspected in August 1961. The 10 cwt area, after 17 months, was still showing up markedly superior to the 5 cwt area and this area was superior to the original "nil" area.

The results of this trial simply confirm what is already obvious in the general vigour and productivity of the pastures: that both higher phosphate dressings and the use of potash will give an **almost** spectacular response.

2. The Clearing of Bush and Second Growth

Obviously a major factor in the increase in production over the years has been the felling of 50 acres of rewarewa bush and the crushing of about 10 acres of scrub. The bush was felled by contract in the winter of 1948 and burnt, surface sown, and topdressed in the autumn of 1949.

This season was a wet one and this resulted in a patchy burn. Subsequently this gave rise to a weed problem. Fleabane, Australian fire-weed, **inkweed**, **teatree**, and tauhinu flourished. The density of these weeds and the large amount of partially burnt timber caused me to make use of aerial topdressing as soon as this was introduced into our district as the only practicable means of obtaining a cover of grass. This, with the feeding of baled hay to the dry herd in winter with the consequent crushing and seeding, achieved sufficient clearance within four years to enable a tractor and spinner to cope with the task thereafter.

The indifference of the bush burn pasture in the early stages and the inconvenience of running milking cows on the area caused me, after two years, to decide to stock it with ewes. I now regard this as a mistake. I believe that dairy heifers extra to my normal requirements would have been better. No new skills would have been required; fencing would have been cheaper; pressure on

autumn-saved pasture and on labour would have been less; and a herd would have been ready and waiting as soon as a decision was made to employ a full-time worker.

The rewarewa timber rotted very quickly and has been entirely disposed of. The area has still not been ploughed, but it is now in excellent pasture and is carrying almost its full share of butterfat production.

3. Regrassing

Of the original 90 acres in grass about 60 acres have been broken up with the giant discs, a crop taken, and then resown to grass. This was discontinued five years ago. At this point I became dissatisfied with the performance of the new pastures for the two or three years after the first winter after sowing down. Now that a further five years have elapsed I feel that I must say this: that whereas from October to March the production per acre from the unploughed areas is at least as good as that from the regrassed areas, probably because of the paspalum content, from April to September the regrassed areas are superior.

I *now* realise, of course, that fertilising, rolling, grazing, and spraying of the new pastures were inadequate and that more enlightened attention to these points would have resulted in better pastures quicker. A neighbour's recent experience with regrassing confirms this.

Regrassing, therefore, is a factor which has made some contribution to increased production, but not as big a contribution as it would if applied now with modern techniques.

4. Subdivision

A satisfactory system of subdivision has been one of the major problems associated with this property. Because of the network of watercourses a central race is an impossibility. A race system totalling two miles with numerous culverts or fords and including many side cuttings has been constructed.

Originally I intended to make all paddocks about six acres in area, assuming that this would be about right for the then ultimate aim of a herd of 120 cows. Several factors, however, have influenced my decision more recently to subdivide more intensively and to halve this paddock size:

(a) With the broken nature of many of the paddocks it often took $\frac{3}{4}$ hour to shift an electric fence in an 6-acre paddock.

(b) While contour fencing has generally proved impossible, the smaller paddocks have forced the milking herd into utilising the short, steep faces which are a feature of the property.

(c) The yearling mob could make a quick clean-up of a 3-acre paddock without detriment to their own condition.

In practice I have found that whenever a new 3-acre paddock has been fenced off it has always appeared to be too small for the herd's 12-hour requirements for the first few months, but that thereafter, apparently because of a quick build-up in fertility, it supplies their needs with ease. I am therefore certain that the smaller paddocks have added to the productivity of the farm as a whole.

There are now 40 paddocks and this will be increased to 48 this season.

Fencing is now being carried out with a single electric wire 30 in. from the ground. Later on earthed barbed wire will be added 15 in. from the ground. I use 5 in. x 5 in. concrete strainers, iron standards, 123 gauge steel wire, and 3 in. alkathene for insulation. This makes a cheap, quickly erected, permanent, and very stock-proof fence.

5. Progressively Heavier Stocking

It was obvious that money spent on heavier topdressing, the breaking in of new areas, regrassing, and other improvements would be wasted without extra stock to eat the extra grass. I have therefore always tried to keep the stock numbers right up to the grass supply. For the first seven years this plan went smoothly. The dry autumn and spring of 1954, however, caused an overstocking problem which I would have been wiser to have met by culling the ewes very heavily and not replacing these. As it was I received a sharp lesson that optimism must be tempered by discretion. Redwater, Tb, and infertility caused losses that were not made up until the 1957-58 season.

Since then, with the fertiliser plan operating, I have tried to increase the herd by what I hope is a conservatively progressive figure of 10 per cent per year. This seems to have been approximately right so far. I would like to emphasise that this policy is coupled with that of increasing the fertiliser bill also by 10 per cent per year. I am conscious, nevertheless, that an easing off of this rate of increase will be needed shortly.

6. Quality, Numbers, and Growth of Replacements

The herd has been mated artificially since 1953. With the exception of a very few animals which were bought, all cows are now artificially bred directly or are the daughters of AB heifers mated to my own grade bulls, who were themselves artificially bred from the top 5 per cent of the herd. Since 1953 the per cow factory average has risen from 245 to 331 lb of fat. I am confident that AB has had some bearing on this improvement. My confidence in saying this is reinforced by the fact that my three herd sires that were surveyed before the change to AB proved to be all below expectancy.

To be able to increase the herd numbers progressively, to prepare for Tb testing, and to provide for normal culling I decided six years ago to increase the replacement rate to 35 per cent. In retrospect I can see that this has been one of the most profitable decisions made.

Not only has it saved the buying of heifers at the very high prices recently ruling, but also I have been able to cull for the first time- as I have wished to without being forced to retain low producers to keep up herd numbers.

I am certain, however, that neither the dairy merit nor the numbers would achieve a great deal by themselves. Each year has seen an improvement in the size and condition of the in-calf heifers. In this connection I would like to make two points.

(a) For the past 12 years I have reared calves by the nurse-cow method. In the early stages of development, with up to 75 cows to milk single-handed, this was invaluable as a labour-saving method. The beneficial side effects, however, have been so great and the disadvantages so conspicuously absent that now that I have adequate labour I have continued with the method. Scouring is eliminated. Growth rate is unbeatable. And now that we are rearing over 40 calves each year the saving of labour is again a relevant factor.

(b) I have only reluctantly over the years become reconciled to the additional labour entailed in Ruakura's recommendation that calves should be frequently shifted. With each progressive improvement, however, toward the ideal of a daily shift we have noticed a marked increase in thrift with the heifers consequently calving down much bigger in frame and able to produce well in their first year.

This combination of AB, high replacement rate and heavy culling, nurse-cow rearing, and the daily shift of calves is at last producing a herd that will adequately convert the better pastures now growing to butterfat.

Time does not permit me to deal in detail with other practices adopted so recently as to be unproven; for example, (a) *Wintering*, where a modification of the Wallace system has permitted the feeding out of silage at a time of the year when the condition of the races will permit the passage of heavy loads and has provided large areas of grass for use immediately before and after calving; and (b) the use of a silorator which has made large quantities of good quality silage available and has eliminated the wastage that used to occur in the topping of pastures.

Finally, mention must be made of the last link in the chain: improvements in the milking techniques and in the milking plant.

This, then, is the simple story of an average Bay of Plenty dairy farm. I can produce no spectacular production figures, and doubt whether my farm is the type where such figures will ever be obtained. One thing I have learnt, and that is that the findings of research can be put into practice on a farm, possibly with modifications to suit local conditions. I feel that much of the improvement achieved has been due to the work of scientists many of whom I have yet to meet.

DISCUSSION

- Q. (A. H. Flay): What was the **labour** complement on the farm during this period? Was it one or more **labour** units?
- A. Up to five years ago it was one man; since then it has been two men.
- Q. (R. W. Moody) : Is the forage harvester used for topping?
- A. During the last two years the forage harvester was used to make silage after every second grazing. This season the Ruakura system of making silage from more mature pasture is to be used as this gives a silage higher in sugar content and therefore better for stock.
- Q. (P. D. Sears): What effect did the cutting of silage on this dry country, have on the pasture?
- A. The **silorator** was used, cutting high, to clean up the paddocks after the herd. Only a small amount was taken, about three loads per paddock. **This** was topping and cleaning up only and had little effect on the pastures. Now we are changing to longer, more mature grass for silage.
- Q. (G. Robinson): Were the poor results in carrying capacity earlier on caused by poor clover growth?
- A. At first not enough super was being used-in addition pastures were damaged by grass grub prior to the adoption of a regular programme of DDT topdressing.
- Q. (Henderson): With the heavy potash dressmgs, how much trouble from bloat did you get?
- A. We did not get bloat at all until this year. On three paddocks that had been hard grazed in the winter, three cows had had to be drenched for bloat, so the three paddocks were closed up for silage.
- Q. (J. Ranstead) : How do you rear your calves on the cows?
- A. There is no skim milk available as I am on whole milk production. I have a special yard and draft off about 15 cows and then select 38 calves to feed on these cows. The young calves are fed first for a few minutes and then the older calves are allowed in. $3\frac{1}{2}$ calves are run per cow. After calves are weaned the cows are given a let-down hormone by the Vet. and the cows then milk satisfactorily from then on.
- Comment (P. D. Sears): In the Argentine the reverse is the case-the cows and calves all run together and the milkers have to kick the calves out to be able to milk the cows.
- Q. (G. Jensen): How long are the calves on the foster mothers?
- A. About until ordinary weaning time, or a bit longer-say 6 to 8 weeks.