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GRASS RATIONING IN RELATION TO PRODUCTION

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THIS short paper should really be called "Controlled Feeding in Relation to Production." It is a progress report on the practical results from intensified rotational grazing on two farms in the Auckland province during the past sixteen months.

The idea was conceived after a discussion with Bruce Levy on some of the intensive pasture control work by Sears at Grasslands and also on the methods employed by Long at Levin in the feeding of autumn and winter spelled pasture.

It was considered that intensified rotational grazing should be tested out over the whole season under farm conditions, including the use of strains of grasses and clovers developed by Corkill. Two dairy farms were chosen—one of 71 acres and the other of 156 acres. Both owners were interested in improving the production of their farms and were willing to co-operate. Both farms were in a run-down condition. Their pastures were poor and below average.

We set out to determine if possible:—

- (1) The effects of intensive rotational feeding on these poor swards.
- (2) The possibilities of improving these poor swards by this form of management.
- (3) The results from oversowing these poor swards with grass and clover seed of pedigree origin, as compared with ploughing up and resowing.
- (4) Ploughing out of grass and sowing down to grass without cropping, as compared with ploughing, cropping and grassing.
- (5) General effect on carrying capacity.
- (6) The effect on production.

The two farms will be described and dealt with separately:—

FARM A.—71 acres. This property was taken over in July, 1947. It was an almost derelict proposition. One fence only was stockproof. The property had been farmed for over 80 years and had been part of a much larger holding. In earlier years, the land had been cropped regularly for wheat, oats and barley and cropping of one kind or another had been continued up to 1935. Several areas had not been sown down to grass after cropping and benevolent Nature had been left to clothe the badly worked bare ground.

So that in 1947 the farm consisted of an area of run-out pasture, with broken-down fences, unkempt gorse hedges and a low-roofed cowshed, obviously built by people of very short stature. Around the shed was about an acre and a half of concrete. This extended out into the paddock like a miniature lava flow. It had evidently been the practice to concrete the muddy, boggy patches created as the cows entered and left the yard. The yard at the shed was large enough to hold at least 120 cows and there was a surprisingly good water system installed.

Twenty-three indifferent cows were milked on the farm. No production records were available, but the owner was very willing to sell.

The only worth-while pastures were one or two near the milking shed—obviously night paddocks. The paddocks at the back of the

farm were sod-bound and nitrogen-starved. No clover could be found on the majority of the pastures. These consisted mainly of browntop, fog, sweet vernal, some perennial ryegrass near the cowshed, flat leaved weeds and much sod-bound paspalum on the nitrogen-starved areas. Rotational grazing had never been attempted and as far as could be ascertained the farm had had little topdressing.

When the farm changed hands, lack of material hampered improvements. Some temporary fencing was erected and the whole farm was limed at the rate of a ton per acre and topdressed with 3cwt. of serpentine super per acre.

By the end of 1947, there were seven paddocks on the farm and the pastures showed great improvement. The herd had been built up to 40 cows.

In Marek, 1948, most of the farm was oversown with approximately 10lb. of certified seed per acre, the mixture being:

- 4lbs. certified mother rye, 92 per cent. germination;
- 4lbs. certified short rotation rye, 94 per cent. germination;
- 2lbs. certified mother white clover, 96 per cent. germination.

The seed was mixed with serpentine super and the fertiliser applied at the rate of 3cwt. per acre.

On the 24th March a start was made with the closing up of pastures for cold storage grass and by the end of April, 26 acres had been reserved for this purpose. This was fed off in breaks from June onwards, using the electric fence. Unfortunately, owing to labour difficulties, the electric fence was not used during the months of September and October. In November, however, it was decided to resume intensive rotational feeding. The pastures at this stage were of fair quality. The sward differed in each paddock, but the effects of oversowing, liming, topdressing and more efficient management were quite evident. White clover, perennial rye and short rotation rye were present in every field oversown the previous autumn.

The daily grass ration was based on Long's figures of half an acre of good pasture at the five to six inch stage. This was calculated to provide sufficient feed for one day's grazing for 60 cows. It will be recalled that Levy allows 140 to 150lbs. of grass per cow daily. At the start of the trial, the same area was allocated for night grazing.

For the start, a single barbed wire, supported by battens, was used for the electric fence. The herd of 43 cows was taken off open paddock grazing and put on to this break feeding. The method adopted was to hold the whole herd near the shed until milking was completed and then to turn the entire herd on to the area fenced off. Drinking water was available.

Pastures chosen for the trial consisted mainly of perennial rye, white clover and some cocksfoot. Little paspalum was in evidence at this stage.

The herd soon settled down on the half-acre allowed. After grazing, most of the cows wandered back on to the adjoining field, which had been grazed already and where drinking water was available. Practically all the animals lay down and only one or two made any attempt to graze. Later, having added their quota of dung and urine to the grazed sward, the herd wandered back at intervals to the fenced area for further grazing. As the trial proceeded, it was noticed that, provided they had space to do so, the cows were inclined to leave the grazing area after eating their fill and to lie down on the area already fed off. The need for water may have been responsible for this, rather than cleanly habits, but only a comparatively small quantity of dung and urine was deposited on the grazed area.

Day to day records were not kept on the farm at this stage. This is a town-supply herd and the only figures available were the milk weights obtained from the organisation handling the supply. These figures showed that when the herd was taken off open paddock grazing and put under the intensive system, there was no marked drop in milk yield. At the start of the trial, a total drop of five gallons was the only indication of the change. This decline was made good by the third day and thereafter the milk yield rose steadily to a peak figure which was 200lbs. daily better than under open field grazing. Production was remarkably constant under the intensive system, the daily average for 63 days being 1,100lbs. Daily variation over that period was never more than 60lbs. No new cows were brought into the herd over the period. At the end of 63 days, a sharp drop in production was recorded however, due to an entire change of feed. To explain how this came about, it is necessary here to describe the seasonal change which took place in the pastures.

In most years, paspalum dominates the pastures on the farm during December. Last year, however, due to fairly wet summer and better management, the ryegrass-white clover combination lasted well into the summer. Some paspalum came into the sward on the areas under controlled feeding, but did not take possession until later than usual. Until January, therefore, the controlled feeding was confined to a surprisingly small portion of the farm—that containing the most ryegrass, approximately 23 acres. Of the remainder of the farm, 21 acres were closed up and harvested for silage and the balance—mostly unimproved—was used for dry stock.

During the flush months of the year, only a very limited area could be controlled under the intensive system. This, it should be remembered, applied only to fair, not good pasture. The problem at this stage was too much feed. Stock could not be bought economically at that time of the year and therefore 28 acres were cut for silage. The aftermath on these harvested areas was mainly paspalum. About the middle of January, however, it became necessary to include some of these aftermath areas in the intensive system. The feed—mainly paspalum—was fresh and at the six inch stage. At first, the same sized breaks day and night were used on these dominant paspalum swards.

The milk yield dropped rapidly under these conditions, from an average of 1,100lbs. daily to 850lbs. daily. In an endeavour to check this drop, the breaks were made larger and larger and finally they were three times the size of the breaks on the pastures containing dominant rye and white clover. Milk yield fell most rapidly where the paspalum had become long, or rank. The stock did not relish this feed, being inclined to overgraze in small patches and consequently, utilisation was inefficient.

General Technique:

Long's method of using the electric fence was tried and found satisfactory. A small weatherproof unit was most efficient. After a few weeks, the barbed wire was replaced by plain wire. This wire was simply stapled to the battens and no insulators were used. After the first few weeks of use, the current was put through the wire once every ten days or so, just to remind the herd that they could not take liberties. Actually no trouble of any kind was experienced using the plain wire.

As the quality of pasture varied from paddock to paddock, it was difficult for the farm manager to determine the size of the breaks by observation. Milk yield was the safest barometer. During the flush period, the area fenced off for night grazing was found to be too large and feed was being wasted. The night grazing area was reduced accordingly to one-third of an acre during this period. This was quite satisfactory.

Use of milk yield as a feed barometer partly overcame the difficulty of assessing the amount of grass on a pasture. If the milk yield showed any significant drop due to lack of feed, the grazing area was increased slightly. It should be mentioned here that during the course of the experiment, an attempt was made to clean graze each break by reducing the area. This was found to be a mistake. When the size of the breaks was reduced to less than half the original area, milk yield dropped and pastures were over-grazed.

As the season advanced and the dry weather set in, the areas were made larger and larger, until pasture growth was at its slowest, when a whole paddock would be used for a limited period only. A good grass mulch was maintained over the grazing area and overgrazing was avoided. With the autumn rains, pastures made rapid growth and the areas for grazing were reduced in size accordingly. No silage was used during this period. The mower was used freely throughout for topping to conserve plant energy.

The general pattern of the pastures under grazing provided an interesting study. Although the cows persisted in grazing in a patch-work fashion, pastures were eaten down much more evenly. A few tufts of ungrazed grass were left on each break and as time permitted these were topped. The quick feeding off was very much more efficient than the open paddock system and pastures were not over-grazed. The cows, knowing that they had a limited, yet sufficient area of fresh feed ahead of them each day and night, grazed these areas down quickly and (because there was sufficient feed) not too hard. Having had their fill of fresh grass, they did not graze much over the area already fed off.

The pastures responded well to this form of treatment and recovery was very rapid.

Production.

Production from this farm has been doubled in one season. The greatest increase has been made during the period of controlled feeding.

FARM B.—156 acres. This property, mainly Hamilton clay loam, has been farmed for a very long period. It has been owned by the same family since it was taken up out of the bush. For 50 years the main industry was cropping—much oats and barley and some wheat were grown, all being sold off the farm. For years, hay crops were also sold off the property. In 1912, the first milking machines were installed, the cropping area was reduced and dairying was commenced.

In 1946, pastures over the whole of the farm were extremely poor, mainly browntop, fog, sweet vernal, ribgrass, moss, cocksfoot, a little suckling clover, with some ryegrass and white clover in the paddocks near the milking shed. All paddocks were large. Hay was the only crop harvested for the winter and 73 cows were milked. Production in 1946-47 was under 14,000lbs. of butter-fat.

An observational topdressing experiment was laid down in 1946 on one of the typical pastures. Soil samples were drawn and sent to Dr. Davies of the Soil Fertility Station, Hamilton. His report, under the quick testing system, showed little evidence of phosphate deficiency. Potash figures were abnormally low and a slight lime response could be expected. The manual experiments confirmed Dr. Davies' findings. Potash responses were most outstanding, both with and without lime. There was a poor response to phosphate and a fair lime response. It should be mentioned that clovers could not be found on this area when the trial was laid down.

The farmer was then persuaded to sub-divide his large paddocks. He used an electric fence for this. The farm was topdressed with

40 lbs. sulphate of potash and 2 cwt. of super. per acre in the autumn of 1947. Response to potash was rapid. Volunteer clovers established themselves quickly in the nitrogen-starved, run-out swards and there was a much better response to phosphate dressings.

This made it possible for the herd to be increased by ten cows. This farmer does not breed his own replacements, but buys in his heifers. Early in 1948, he was persuaded by Ford and others to go in for controlled feeding. Commencing in February, 1948, he used similar methods to those described for FARM A. The effect was soon apparent. Breaks of roughly an acre in extent were used and production improved. This early controlled feeding allowed a considerable area to be closed up for autumn and winter grass. The herd was increased to 87 cows. Break feeding was continued through the autumn. Hay saved the previous spring was used sparingly. In July, 1948, there was too much grass on hand and three paddocks were closed for early silage. Production was increased by over 4,000lbs. butterfat, compared with the previous season. The herd had been increased further—to 104 cows.

With the feed getting ahead of the cows, it was necessary to close up an increasingly large area for silage. During the spring of 1948, some 350 tons of silage were harvested. No hay was made. There is very little paspalum on this farm.

In the early spring of 1948, the herd was increased again—this time to 114 cows. Using similar methods to those applied on FARM A, the herd was carried right through the summer on grass alone and a large reserve of silage was left as a handsome insurance. Further, under this system of management, the pastures improved rapidly.

Production for the 1948-49 season, although not yet complete, shows a very considerable increase over that for last year. Practically the whole season's grazing has been under the controlled feeding system.

It should be pointed out that the pastures on this farm, although improved, are still poor and low producing. The present farmer, a young man, has, as a heritage, the result of 60 years of soil mining.

Being young, keen and enthusiastic, with an extremely able uncle to provide the mature leavening, he now intends to plough up and resow the whole farm. In March, 1948, he made a start. Eighteen acres of new grass were sown, following a crop of soft turnips and swedes. The mixture used was:

Certified mother rye, 20lbs;
Certified short rotation rye, 15 lbs;
Certified cocksfoot, 6 lbs;
Certified mother white, 3 lbs;
Certified broad red clover, $2\frac{1}{2}$ lbs.

46½ lbs. per acre.

This area of young grass was fed down quickly in the first two months with sheep. It did very well indeed and was brought into the grazing rotation during the spring of 1948. In January, 1949, this 18 acre paddock of new grass carried an excellent establishment of red clover and cocksfoot. Under controlled feeding, the 18 acres provided 22 day grazings for a herd of 115 cows. The results from this 18 acres were so encouraging that a further 28 acres were ploughed and sown back into grass in March, 1949. The same mixture was sown, with an additional 2 lbs. of certified broad red clover. Despite a dry autumn, establishment was quite good, due to early cultivation and plenty of consolidation. Sheep were not available for the first grazing

and the young grass is being grazed under the controlled feeding system by the dairy herd. Day to day records are not available for this farm and a summary only can be given.

This young farmer considers that controlled feeding, plus the use of improved strains of grasses and clovers, will enable him to carry a cow to the acre on a property which, three years ago, would support only indifferently, a cow to 2 1-7 acres.

SUMMARY.

The results on both farms can be summarised: It is much too early to arrive at conclusions and it would not be wise to do so at this stage.

Comparing the open paddock grazing with controlled feeding, one is impressed with the enormous wastage of plant energy which must take place under the old paddock system. Under controlled feeding, a five acre paddock of fairly good pasture has been able to provide sufficient feed for 44 cows for 10 days, or for 6 days and 6 nights during the flush months of the year. This method allows for most efficient utilisation, gives the stock all the feed they require, prevents over-grazing, over-poaching in wet weather, gives an even distribution of dung and urine over the grazed area and increases and maintains production. The value of the system can perhaps best be expressed in the form of a question. Could the same results be obtained if a herd of 44 dairy cows was turned into a five acre paddock of fairly good grass for 10 days on end?

From the results of 10 months' trial under farm conditions, it seems that the following can be said for and against controlled feeding:—

FOR:—

It enables pasture production to be better and more evenly spread throughout the year.

Stock have access to an area of fresh, clean pasture every day and every night.

Carrying capacity and production can be increased considerably. It works more efficiently on improved pastures than on the poorer swards.

The grassland farmer can plan his feed well ahead, with a greater degree of certainty.

Pastures can be grazed quickly, evenly, but not overgrazed. Their recovery is thus speeded up.

Stock can be trained to adapt themselves to this method of intensive feeding without trouble.

With the knowledge of adequate fresh feed every day and every night, they become contented and do not wander. This means less poaching in wet weather and consequently less weeds, such as buttercup.

Pastures can be kept in a well-balanced state, with minimum wastage of plant energy.

Dung and urine can be well spread and concentrated on the grazing areas.

Stock health is maintained. There was no evidence of bloat during the trials.

The method saves labour. It is easy. Less supplementary feed is required and thus more time can be spent on other farm work.

The electric fence can be used as a most efficient, mobile instrument on pastures at all times of the year for increasing stocking and production immediately, without alteration to existing fences.

AGAINST:—

The difficulty of accurately assessing the amount of grass available on the various pastures.

The need for frequent use of the mower for topping, especially during the flush months.

Difficulties of control, during the flush months, of those pastures not under this form of intensive grazing.

The difficulty of knowing at what stage of growth to commence controlled feeding.

If a 6 acre pasture is allowed to get to the five inch stage all over and is expected to last for 12 day grazings, during the flush the last break can almost be ready for cutting for silage.

The difficulty of adapting this method of grazing to the existing water supply.

The problem of how to fit dry stock into the intensive system.

How to apply this method to pastures at the back of the farm in the early spring, especially on cold, dark, wet mornings.

The difficulty of adapting the method to suit hilly, or broken country, shady faces and gullies.

The difficulty of access to distant paddocks. On many farms, the means of access to these paddocks is through others which may be spelled for grazing.

The problem of gateways.

The difficulty of using shelter to the best advantage during cold, wet and windy weather.

The trouble involved in moving that electric fence almost every day, wet or fine.

And the consequent temptation to go back to open paddock grazing.

My reason for presenting this paper has been to endeavour to show what has been done so far; how production has been affected when controlled feeding has been tried out under practical farm conditions and I should now like to throw the whole matter to the conference for discussion.

Do you think this method of controlled feeding is sound?

If so, is it worth further development and how could the technique be improved?

Can it be applied to the dairy farm to increase production rapidly?

Can this system be used to speed up production and increase the carrying capacity on those farms producing fat cattle, or fat sheep and cattle?

And, finally, what, in your opinion, are the main disadvantages of the system?

Discussion on Mr. Woodyear-Smith's Paper

MR. LONG: I am interested in this paper as I have seen both these farms. My own experience has been to ration grass for winter feed only and naturally I am interested in the results of applying it all the year round. I agree with Mr. Woodyear-Smith's summary of the advantages and also the disadvantages he has given. The advantages far outweighed the disadvantages for the winter milk production, and I would like to hear other comments on applying it all the year round.

MR. NEILSEN: There is no doubt in my own mind that the methods are sound. It is the only real way of utilising pasture to the best advantage. We have quite a number of farms that are practising this method. The difficulties, I think again, have been ably summed up in the paper. It cannot be practised on every farm to the same advantage. The farms, even in the Waikato, vary quite a lot in contour, availability of the water, and difficulty of access to sheds on farms—sheep may have to be taken back through paddocks which should be closed and hence we have to fall back on other paddocks. These are the difficulties we find in trying to implement this type of thing. Against this system one thinks of a farm, the story of which will be written up for the Exporter this coming month. The farm was 187 acres with a production of 57,000 lbs. fat factory return. The herd of 140 cows was divided into two herds and run as such with only six paddocks. When I was there last month there was quite a lot of roughage on the farm and one would say very bad utilisation of pasture. When I asked if the owner did not think this pasture could have been utilised to better advantage he said there was a day when he put surplus into silage stacks but not now. He can get just as good results without doing that. He does not do any of those things that are suggested in this paper, yet he has 350 lbs. to the acre. Would you suggest that I could put his kind of system into operation and get away with it? It comes back to the question of how to get 44 cows into a 5-acre paddock. I have 16 cows on 16 acres. If I tried to run those cows on three paddocks I would not have very much feed left but in the set-up outlined we can get quite high production on relatively little feed. I feel personally, after seeing the methods at Ruakura, that to get the best utilisation out of our pastures we will have to use electric fences. We want to be careful when we start to generalise, but I would say by observation and knowledge of a large number of farms, that the practice of winter stored pasture is a common one but the utilisation of that pasture varies tremendously. There are few people utilising even that stored pasture to advantage. They are turning the herds into pasture and destroying much of the pasture that has been saved. In my own mind there is only one way to utilise pasture to the best advantage and that has been summed up in the two farms that have been illustrated. I feel personally that if we can sell that same idea to the majority of our dairy farmers we would step up production very quickly.

MR. MANDENO: One of the important points brought up by Mr. Woodyear-Smith is the selling of the idea to the industry so that we might raise production through the country. I have found that one of the main difficulties is that farmers say, "Well, I haven't got time to do all these changes with the electric fences." I would like Mr. Woodyear-Smith's assurance that the labour, on the 71 acres especially, is not unduly heavy.

MR. WOODYEAR-SMITH: The labour on that one farm consists of one man and it takes him approximately a quarter of an hour to move his fence for both day and night grazing.

MR. TAYLOR: To my mind the greatest point made in Mr. Woodyear-Smith's paper was the fact of the improvement of pastures. In both cases he mentions the system of fencing off was adopted on farms with run-out pastures and in both cases an improved pastures resulted. Also his recommendation of over-sowing would be of benefit on very many farms. We saw from slides the results which were obtained from that practice. Within the last few weeks I have been on at least 100 farms where the pasture, to a greater or less extent, would conform to the description Mr. Woodyear-Smith gave of those two farms before they were taken under good management. Fencing on the farms I was referring to, broadly speaking, divides them into paddocks which are far too big for economic utilisation of the pasture grown. I was on a farm where grass had been saved last autumn, a year ago, and utilised in the spring by fencing off in breaks for a period by electric fences. Then the electric fence broke down. The portion that was fenced in breaks was efficiently utilised but the major portion which was subsequently grazed in one paddock even to-day after nine months' grazing is still very tufty as compared with the area that was fenced in breaks. One question I would like to ask him in relation to the oversowing of pastures is, what period of the year was this done? Was all the oversowing done in the autumn or was some done in the spring, and what preparation was given? Were the paddocks merely harrowed and oversown or were they in some cases disc'd?

Mr. WOODYEAR-SMITH: All the seed was sown in March, 1948. The paddocks were not harrowed. The seed was sown with fertilisers.

Dr. McMEEKAN: I would like to make this one comment. After five years' experience of the two systems that have been discussed by Woodyear-Smith, side by side on strictly comparable farms in the district, under controlled conditions I am not at all certain in my own mind from those results and from that experience that the advantages are all with the controlled grazing system.