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The productivity per unit of labour is therefore very low, but per unit of acreage is above New Zealand. These are "productivities" not efficiencies. In New Zealand also we have much larger than average farm enterprises, and as you know as a farm unit increases in size so also it increases in the efficiency with which it is able to use labour and capital.

Mr. Whittleston raised the point as to how it is that, if the New Zealand farmer produces more on the average than the average person in secondary industry, there is such a general impression abroad that he doesn't get a greater income. First of all, there is some misunderstanding which arises from the fact that we are talking in averages. When the farmer compares his position with the position of the average person in secondary industries, he is inclined to look at the successful people, the managers, etc., rather than the workman, and to forget that a very considerable number of people in secondary industry are in receipt of relatively low salaries and wages. Then there is the difference between the "produced real income" and the "consumed real income", a difference which is affected by tariffs, embargoes, taxation etc. When you deal in terms of "consumed real income" the difference between primary and secondary producers in New Zealand very nearly disappears.

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"SUMMER FATTENING OF LAMBS IN CANTERBURY"

(Summary of Paper)

by

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GENERAL: There are a number of reasons why a large proportion of the farmers on the Canterbury plains grow rape as a summer fattening feed for lambs. It is seldom possible, because of climatic reasons, for more than 30 to 60 per cent of a farmer's lambs to be sent away fat off their mothers. Rape forms a useful place in the rotation with wheat; pastures are, in general, not permanent and rape is again useful as a crop before sowing down to pasture again.

Approximately three years ago, the sweet blue lupin was introduced, and because of its resistance to early insect attack, its ability to grow on light soils, and its palatability, this feed may have an important place in the summer fattening of lambs.

Occasionally very severe mortality is expressed amongst all ages of sheep in Canterbury, most of all amongst lambs fattening during late summer. Following such a period of losses in 1937/39, experiments were commenced at the beginning of 1940 to investigate the various factors involved in this mortality. This paper summarises the results of five summer fattening experiments with rape and two experiments with sweet blue lupins.

There were no occurrence of general mortality during any of these years, but the opportunity was taken of investigating the commonly used methods of fattening rape as well as testing other hypotheses concerned with methods of lamb fattening.

In the first three years the number of groups was considerable, but from an experiment involving 12 groups in 1940, it was possible, by eliminating various hypotheses proved false, to reduce the number to 4 over the last two years.

METHOD: Corriedale or half bred store lambs were used each year, bought as one or a number of lines at Addington saleyards. In 1943/44 lambs reared at Kirwee were used. The rate of weight gain was adopted as the main measure of assessing treatment value. Regular faecal egg counts were made upon at least one-third of the lambs in every group as the assessment of pathogenic nematode infestation. By the use of a field bagging technique, in association with dry matter digestibility trials done in pens at the same time, the dry matter and organic matter consumption of lambs either getting rape alone or rape with hay was measured. It was possible to determine the rape-sparing effect due to the hay consumption in this way. Half of all groups or the whole of some groups were drenched, either with 1 oz. of a 2 per cent solution of copper-sulphate and nicotine-sulphate (1940, 1941, 1942) or 15 grammes of phenothiazine, (1943, 1944).

RESULTS: It was early shown that the addition of a comprehensive mineral supplement or of vitamins "A" and "D" had no effect, and that the exhibition of such supplements as barley, oats or hay similarly resulted in no greater weight gain than that made by lambs getting rape alone. In fact, the outstanding result has been the emergency of the method of set stocking on rape with no run-out as the quickest way of fattening lambs.

Table I shows the mean weight gain over the whole period of experiment in each year for the 4 main groups:

TABLE I

Mean Weight gains of selected Groups, 1940-44. Weight gains in lb.

<u>Treatment:</u>	<u>1940:</u>	<u>1941:</u>	<u>1942:</u>	<u>1943:</u>	<u>1944:</u>
Set grazing (no run off).	18.1	22.4	25.1	13.7	21.1
Set grazing with run-off (all night).	17.7	17.3	21.1	8.6	15.4
Set grazing plus oats.	12.3	17.3	23.6	-	-
Break grazing (7 day) No run-off	18.6	23.8	-	18.6	21.6
Break grazing or set " plus hay.	18.5 Break Graz- ing plus lucerne hay	19.8 Break grazing plus sub- clover hay.	25.5 Set graz- ing plus sub- clover hay.	14.5 set grazing plus sub- clover hay	20.6 break grazing plus sub- clover hay.

It will be seen from the table that the giving of a run-off all night results in a slower rate of weight gain, which in some years was significantly lower than the group being given no run-off. Similarly the feeding of rape in 7-day breaks, under the conditions prevailing at Kirwee during the past five summers, does not result in a better rate of weight gain.

The bagging trials revealed a fairly constant dry matter intake in the lambs getting set grazed rape of from 986 grams to 1629 grams, with an average intake of about 1000 grams. The rape-sparing effect may be seen by the measurement made in 1941 when an intake of 143 grams of dry matter from hay resulted in a saving of 565 grams of dry matter from rape, when intake on rape alone was 1,629 grams dry matter.

The main faecal egg-count figures are given in Table II and it will be seen that although there is a difference in favour of the drenched groups each year the general level, except at the beginning of the trial in 1943, is so low that pathogenic effects from worm infestation could not be anticipated. This is confirmed by the fact that in every year, except 1943, there was no difference in the weight gain made by drenched lambs compared with those left undrenched.

TABLE II

(Mean faecal egg counts over all groups at beginning and end of experiment).

Year?	Eggs per gm. of faeces		Eggs per gm. of faeces.	
	Drenched		Undrenched	
	Beginning	End	Beginning	End
1940	740	416	1,894	1,195
1941	630	210	690	330
1942	1,074	110	1,091	424
1943	3,000	418	3,195	923
1944	748	130	798	260

It will be noticed that even in the undrenched groups in each year there is a considerable fall in faecal egg counts from the beginning to the end of the experiment. It is possible that two factors are mainly responsible for this, firstly the avoidance of re-infestation and, secondly, the development of age immunity.

SWEET BLUE LUPINS: Because of the scarcity of seed it was only possible to have a restricted trial of this feed in 1943 (6 weeks), but in 1944 half of each rape paddock was sown to sweet blue lupins and an equal number of lambs given the same treatment as the rape lambs, were run on sweet blue lupins and so offer a direct comparison with lambs fattening upon rape.

Table III shows the mean weight gains made by the four groups on sweet blue lupins and the gains made by the similar rape groups.

TABLE III

Mean Weight gains of S/B lupins and Rape
Lambs - 1944.

<u>Treatment:</u>	<u>S/B lupins</u>	<u>Rape:</u>
Set grazing - no run-off	21.8	21.1
Set grazing - run-off all night	14.3	15.4
Break grazing (weekly)	21.7	21.6
Break grazing (weekly) plus clover hay.	22.8	20.6

Thus it will be seen that the lambs on sweet blue lupins made closely similar gains to those on rape. It was noted, however, that in both years there was a greater bulk of feed with lupins, an observation which was confirmed by the number of lambs it was possible to fatten both on primary and secondary growth. Further, when lambs were free to graze both second-growth rape and second-growth lupins, it was the latter they preferred. The amount of feeding obtained from the second growth depends upon the degree to which the plant is eaten down during the first feeding. If the main stem is not completely defoliated and bitten down more than approximately 20 per cent from the top, there is likely to be fully as good second growth as occurs with rape under similar conditions.

SUMMARY:

- (1) Of the methods tested it appears that the most economical way to fatten lambs upon rape is by continuous set stocking.
- (2) The addition of such supplements as oats or barley ad lib, or of clover hay at 1 lb. per head per day, did not increase the rate of weight gain. There is a variable rape-saving effect.
- (3) The provision of a run-off to pasture, whether for 4 hours daily or all day or all night, resulted in poorer weight gains being made compared with continuous set stocking. The amount of rape saved varied with the length of time on the run-off and the amount of pasture thereon.
- (4) Drenching with 2% copper sulphate/nicotine sulphate mixture in the earlier trials or with phenothiazine had no effect on weight gains except in one year when the worm burden was comparatively heavy.
- (5) Limited trials with sweet blue lupins in comparison with rape indicate that lambs fatten as quickly upon this type of lupin as upon rape. The lupins had a higher carrying capacity and were resistant to insect pests.

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DISCUSSION

Dr. Filmer: Mr. Ewer has done some of the work that our President was advocating last night. As he told you we set out to investigate a trouble which occurs every so often. We have found it occurs "every so oftener" in the North Island. He has improved the shining hour and done some very valuable work in regard to the practices of lamb fattening in Canterbury. Had he had a little more time he could have told you a great deal more about this work. It has thrown quite a lot of light on the common practices of rape grazing. Canterbury people today are still using run-offs. Some of them still feed hay and oats, some practise break grazing. In normal years it has been shown that there is no increase in fattening rates from any of these practices. In regard to the run-off - in a normal year it would not be justified. In some cases it has actually caused a decrease in rate of growth. The work being done in regard to measuring the intake of rape will be of great importance and indicates our need for "normals". Some of the results show that intake varies from year to year. In the year when the gain in weight was so much lower, the intake was lower. One thing we don't know is just what a lamb does require in the way of intake from rape to make optimum gains. Again this is just one of those "Normals" that we require for all this kind of work, and we hope that some of these will be provided by Mr. Ewer's work.

Mr. Duncan: What were your experiences with rape scald?

Reply: We have had very little rape scald. It does turn up but only in a very transitory way. Occasionally a lamb shows some slight swelling of the ears. We have had no severe cases of rape scald.

Dr J.B. Swan: Has Mr. Ewer had any experience with poisoning by lupins?

Reply: The lupin we are using is the sweet blue lupin, a recent introduction to New Zealand. As far as I know there have been no reported cases of poisoning with this type of blue lupin.

Mr. G. Holford: I believe the growing of sweet lupins in Canterbury has distinct possibilities, and for this reason - when in Germany in 1937 I learnt that lupins, better than any other crop, utilise the "locked up" phosphate in the soil. We know that a high percentage, 80% and over, of applied Superphosphate is fixed in the soil - the percentage depending on soil type. Some authorities in Germany view the properties of lupins to utilise relative unavailable phosphate as of more importance than its nitrogen gathering properties as a legume.

With limited supplies of nitrogenous fertiliser for rape crops, lupins under present conditions may give a higher stock carrying capacity in Canterbury than lupins. Lupins are freer, too, from pests than rape and are likely to prove a more reliable crop year in year out.

Dr. P.R. McMahon: What is the situation? There are two kinds of blue lupin. Have these two always been identified on the New Zealand market? I know of a man who grew blue lupin and his sheep would not touch it.

Reply: I am not familiar with methods of identification on the market, but I do know that sweet blue lupin has been grown on contract now for two years in an endeavour to multiply it, and its price is high. As always, amongst the sweet blue lupin there will be one or two bitter blue lupin plants. These are quite obvious because the sheep leave them to the last to eat. I can only say that the man must have been wrongly sold bitter blue lupin. You could easily test it by biting the stalk - the bitter blue lupin is bitter.

Mr. H.O. Askew: I was interested in the rape sparing through the feeding of hay. Is that possibly due to a balance up between protein and carbohydrate? I think very often the run-off fields are somewhat poor. Has Mr. Ewer any information in regard to run-offs in which there is a fair amount of dry feed left? There is one further point too, in regard to set grazing using the whole field for grazing at one time; how does that come out in feeding days per acre as compared with break grazing?

Reply: So far as the amount of food available on run-offs is concerned, it has varied from year to year. The group with a run-off has done significantly poorer than any other group. This year 1944, this run-off was a very good one. I can only say that we have not yet done any bagging trials on this open run-off because of the complication of getting rape and run-off. It is possible that the total dry matter is as great as those on rape, but the quality of food is not as great as those on rape. So far as those getting break-grazing are concerned, there is very little difference in feeding days. Our procedure is with the set-grazing to have them on an area for about three weeks. In that time the group getting break grazing would have three breaks. I can only judge that the amount of rape left on the breaks is hardly greater than that on the set-grazing. As regards planning the diet: we found that those groups being given supplements don't do as well or any better than those not receiving them.

Dr. W.M. Hamilton: Mr. Ewer has given us the rate of gain per animal. Has he any information on the rates of gain per acre? It seems to me that the question of giving supplements or of giving run-offs may be important as a means of economising in the use of a limited area of rape.

Reply: I have no information on this question.

Mr. R.E.R. Grimmett: In regard to this question of sparing action on the dry matter intake. Has Mr. Ewer any observations to suggest whether that is due to a lessening of the appetite of the sheep? Perhaps they don't want to eat so much rape, or have they less opportunity because of the amount of time they spent on the hay? Are these different rates of gain on the basic treatment, the set-grazing, in any way correlated with differences in the chemical composition of the rape, particularly in 1943, or is that purely an intake difference?

Reply: It has not been correlated with any difference. Miss Bartrum has been doing all the chemical work. Possibly it is an appetite effect - why, still remains to be shown. I think it is not a question of the time they spent nosing about but just a question of getting dry matter from the hay.

Mr. W.M. Webster: As regards drenching, what drench was used and at what intervals? Was there any significant difference between the drenched and undrenched groups as regards the amount they increased in weight?

Reply: Two types of drenches were used:
1940-41-42 we used two per cent. copper sulphate, nicotine sulphate.
1943 and 1944 we used phenothiazine.
There has been no difference in weight gain between drenched and undrenched, except in 1943 when there was a significant difference between the two groups in favour of drenched.

Dr. H.J. Geddes: There are certain local beliefs in connection with feeding of rape:
(1) Rape must reach a certain stage of maturity.
(2) Regrowth rape is of very little value for fattening purposes.
Have you any information on differences caused by feeding rape of different stages of maturity?