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higher prices. You also tend to make a greater demand for tertiary services, which would again help to raise costs. In a time of constantly increasing prices the farmer may not miss out but usually costs overtake prices and the farmer's real income starts to decline before the peak of the price cycle is reached. I think he has been very wise to support a policy of stabilisation during the war period.

Dr C.P. McMeekan: Does Dr Hamilton think we would get increased production from New Zealand primary industries by a decrease in price? I have in mind the very considerable increase in production during the depression under the stimulus of a reduced reward.

Mr C.H. Courtney: Would you not agree that conditions during the depression had a direct relation to the unemployment existing? It is exactly the opposite now - there is a demand for labour for other purposes.

Reply: If you had a slump in world conditions which led to a fall in price for dairy produce, and provided that wages were not maintained at artificially high levels, then you would - as in the depression - get an increase in production in an attempt to meet interest commitments. If you lower the price artificially I think all you would get would be an explosion!

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GENERAL DISCUSSION ON FIRST DAY'S PAPERS:

Dr C.P. McMeekan: I myself have been very much in the position of Dr Hamilton's 'Alice', in being, I am afraid, more or less hopelessly confused at the present time. Mr Fawcett has given us what might be termed an "Atlantic Charter for Empty Bellies", and the other four speakers have dealt with our natural resources and have suggested that we might be able to do something to fill these empty bellies. Viewing the material that has been brought before us in a realistic manner, I think that the most striking suggestion came from Dr Filmer when he drew our attention to the fact that in two animal food products at the present time - skim milk and whey - we are wasting as much nutritive material as we are producing at the present time in our total fat lamb and cheese output. That surely is a fact which requires close examination, not merely from the point of view of checking its accuracy (with no reflection at all on Dr Filmer's figures), but first of all to see if it is really so and secondly to see what we can do about it. We have with us today several people who have had experience of the manufacturing side of dried skim milk, of skim milk cheeses and products of that type. We have several people with knowledge of the manufacturing and trading aspects of that type of product. I would like to hear their comments in that regard.

I would like to comment on the other fairly challenging statements of Dr Filmer's in respect to the importance of dairy cattle improvement, because that is a subject which has exercised the minds of quite a number of us, both on the research and the practical side, of recent years and considerable progress has been made I believe, particularly during recent years as the result of the activities of the New Zealand Dairy Board's Herd Recording Department. But if there is one lesson which should first of all be taken from Dr Filmer's data is it not this? That we must, to get anywhere with improving the inherent efficiency of our dairy cattle, locate far more bulls of the required standard than we are locating at the moment. Dr Filmer pointed out that we are getting only about a couple of hundred a year and we need approximately 6000 to inseminate the whole of the Dominion herds. Is not one of the real jobs therefore a job of persuading the dairy industry to

place a very much greater proportion of its cattle under test so that an increased number of bulls of proven merit can become available? I agree with Dr Filmer that a very strong case exists in the meantime for the use of the sons of proven sires, because even on the most optimistic estimate it would take many years to put even one million cows in this country under test. I have worked out that approximately that number would be required to give us the coverage that is really necessary.

In so far as the plant side is concerned there is one aspect that I would like to hear comments on from members, and that is relative to the suggestion of Mr Callaghan's that as a step towards laying down increased areas of our highly, or potentially highly productive land in highly productive pastures increased use be made of supplementary crops which in the initial stages would provide us with more food for stock. I would like some information upon the possibility of speeding up that process by a little by-passing right from unimproved grassland to improved grassland with out imported strains of pasture plants. Is it necessarily sound, under existing conditions of labour and machinery and so on, to waste the year and sometimes two years necessary between breaking up an old pasture and sowing down a new one? Are there any possibilities over a big area of our country in breaking up old worn out poorly productive swards and getting them straight into high class production?

In conclusion I would like to congratulate all the speakers. When those of us who were responsible for drawing up this programme decided upon this day as a day woven round the Hot Springs Conference, we had in mind one main objective - the aim of introducing to those workers in New Zealand on the scientific side of agriculture (since most of them today are young workers) something relative to the background of the industry with which they are associated. I think the speakers have fulfilled that objective ably and effectively.

Mr A.H. Ward: There are two or three points I would like to pose as questions to the speakers, and in so doing to take the opportunity to try and get an answer to some of the practical questions arising at the present time.

The point I want to ask Dr Filmer - and I am suggesting that to some extent this involves the question of the use of sons of proven sires throughout the industry - is whether, in placing the order of his proposals in 1, 2, 3, 4, and 5, and having in fifth place the one relating to pedigree breeders and their use of outstanding bulls by artificial insemination, he intended that to be in order of merit. Is it not true that if the pedigree breeders were to use by artificial insemination the outstanding bulls in the industry they would be able to supply the industry to a very considerable extent with sons of proven sires very much more quickly than could possibly be done in any other way? I mention that because approximately 300 pedigree breeders actually supply the industry with two-thirds of our pedigree bulls. If these 300 breeders could be supplied with the use of semen from outstanding bulls they would, within a period of ten to fifteen years, be able to supply the industry with sons of proven sires sufficient for our needs.

In regard to the problem of what are the main causes of the differences in productivity between the respective land districts in New Zealand, I would ask why it is that Taranaki has a productivity per cow unit of over 25% in excess of that of Northland, and in turn is superior to the Waikato, Manawatu, and other dairying districts? To what extent can improvement in pasture and better adaption of pasture to soil types pull up some of that leeway in productivity between districts? To what extent is inferiority in stock responsible? To what extent are practices prevalent in that district, in the way of husbandry, perhaps responsible? I think the answers will be bound up in the

relationship of the soil including climate and nutrition including pasture species, and the question of whether the length of the dairying season in those districts can be increased to the same length as that of Taranaki.

Concerning Dr Hamilton's paper - what is going to be the economic situation consequent on a sustained drive for increased production at the present time? Immediately the war is over there will be a very high demand for agricultural products, particularly dairy produce. The producer will be asked to expand production as rapidly as possible in order to meet those demands. Under normal circumstances saturation point will be reached within 5 or 6 years after the war. To what extent can steps be taken to safeguard the primary producer when that position is reached? Will there be a glut on the market or will there be some organisation to stimulate and develop consumption to the point necessary to safeguard the primary producer.

Turning to the question of the Asiatic markets - what are the economic consequences of developing a large scale trade with these countries? I am conscious of the staggering figure relating to the waste in skim milk in this country. If at any time we attempt to convert our skim milk to a better use and attempt to develop a market with countries such as China and India, then what are the economic consequences of that?

Dr P.R. McMahon: I would like to emphasise two important points about clothing in relation to food supply:

- (1) There is, on the consumption side, a very important relationship between textiles and the amount of food necessary for maintenance of comfort.
- (2) The connection between wool growing and meat production and the resulting benefit to our meat industry is to a very much larger extent than is generally realised dependent on the prosperity of the more wholly wool growing farmer. If that farmer becomes unprosperous then our meat industry suffers, no longer having its chief source of such material in the form of cast ewes and store sheep to draw upon.

I feel that that aspect, coupled with the very critical danger from synthetic fibres, is likely to have repercussions in our production of meat in New Zealand and probably throughout the world. I would like to ask Mr Fawcett whether any thoughts in this direction were raised at the Hot Springs Conference?

Mr G.H. Holford: The opening speaker's remarks were a guide to the whole discussion. Up till the present time we have been under the shadow of restriction. It began at Ottawa and has been over us ever since this question arose of whether our exports are likely to be restricted. I think the fact that they are not - at least for some years - alters the whole attitude of this country to production. When we look at this Soil Survey Map we must be seized with one fact - New Zealand is a country of relatively very poor land. I doubt whether there are a million acres of naturally fertile land. We are dependent to a very large extent upon induced fertility plus climate. That determines our future agricultural efforts. The thought has come to my mind several times as to whether the idea of farming is to be limited by the capacity of the human stomach. I have been interested in the idea of chemurgy. This is the use of farm products not only for human nutrition and clothing but for industrial purposes. We have no worthwhile minerals or metals for industry but we can grow chlorophyll in plants and through this the energy of the sun converts materials into products that can be used in industry. There has been increasing industrial use for these chemurgic

materials, in the shape of plastics and so on. However there is no time to enlarge this subject further. Possibly we may not be restricted to just the animal products and farm plants in New Zealand. The facts that I have mentioned may have to be considered in the future development of products from the land of New Zealand.

Dr. Doak: Mr. Callaghan in his address mentioned the question of dehydration in connection with the feeding of Europe and European countries. I wonder just how far dehydration will help in doing that? For a few months after hostilities cease we may be able to do something. The thing that has struck me is: has any attention been given to the question of New Zealand raising high class seeds whereby those people can provide their own vegetables in a more satisfactory form than by dehydration. It seems to me that there may be a shortage of good vegetable seeds perhaps throughout the whole world for a year or two, but most countries if they could get seed would be able to produce all the vegetables they require starting from about six months after receiving seed. I really wonder whether we, in this country, are paying enough attention to the question of improving our seeds and, what is more multiplying them so that they can be distributed.

Mr. R.E.R. Grimmett: An aspect of the Soil Survey map which is presented by Mr. Taylor should receive discussion: how far imported methods - as developed in America in the Tennessee Valley in contouring and strip farming and soil surveys in use, might alter the boundaries at present existing for the different types and classes of soil which are given? You have your imported machinery and new methods of dealing with cultivation of land; how far might they alter the boundaries given by making some of the uncultivable land into cultivable category?

Mr. C.H. Courtney: It appears that, during the next few years the producers of foodstuffs will be in the position of producers of munitions. There will be a demand for quantity production irrespective of cost. It seems the important steps are to improve the quality of our animals, our soils and our plants so that we will be prepared to face world competition, and above all to maintain the quality of our products so that when the salesman has to go out his task will be lightened. The question of farm costing and accounting so that the efficiency on the farm may be improved is also important. I speak of it from the aspect of the educational value. That is a matter that has to be considered in any business - If there is to be efficiency we must have accurate costing.

Dr. I.L. Campbell: Are we to regard all our contributions to the needy nations as subject to a strict payment, or is there a suggestion that we might give freely shall we say, food, this to be regarded as a premium or an insurance policy for the goodwill of those nations for future world peace? Are we to be paid for our contribution or is there any gift from our point of view?

Dr. Filmer, would you suggest that herd testing's main contribution to the dairy industry is through supplying it information on which to base a reasonably sound breeding policy? If so, then the industry as a whole is getting the benefit from those who are testing, who make up quite a small proportion of the dairy farming community. Would Dr. Filmer say if he believes the charge made to those who are testing is in fair relation to the service they receive in relation to the service received by the rest of the industry who may not be paying fairly for that added information.

Dr. Hamilton showed some interesting figures on the efficiency of farm labour in different countries, and the New Zealand labour efficiency showed up remarkably well. From observations of labour here and overseas, I think we may rate our farm labour fairly high, yet I doubt if our labour is so much

more efficient, man for man, as shown by Dr. Hamilton's graph. Is not that a reflection mainly of the favourable climatic conditions of this country? Therefore the position may not be quite as favourable from a labour point of view as shown by Dr. Hamilton's figures. Does Dr. Hamilton think we could make this figure even better than it is by pushing ahead on the development of further gadgets or the mechanisation of farming? We could illustrate this type of development by the electric fence; it has increased the efficiency of utilisation of pasture. In that connection does Dr. Hamilton think there is scope for increased efficiency in the development of contract work with machines which are too costly for the individual farmer to be able to afford as single units of equipment?

Mr F.F. Hancock: I would like information on suggestions as to how we might be able to avoid waste in our dairy by-products. My suggestions are:-

- (1) A general swing-over to cheese production.
- (2) Manufacture of skim milk cheese.
- (3) A lowering of the fat content of the New Zealand cheese which is rather high.
- (4) Production of whey cheese. The Norwegians make this and it is highly relished by Americans.

Professor W. Riddet: With regard to Mr. Fawcett's paper; one of the difficulties which I foresee is that, in the clean-up after the war, I doubt very much whether the countries of the world are going to live up even to a modification of the Atlantic Charter. We have had the spectacle that in those countries which are predominantly agricultural the standards of living have been low and the only method of helping them out is to permit them to develop industrialisation. Has the matter been discussed, and in particular has this aspect been discussed - whether the industrial magnates of the world are willing to allow India and China to become industrialist countries to raise the standard of living to a point where their people can pay for sufficient food. If the magnates are not willing to do so, then are the countries sufficiently genuine to give to the needy masses of the people the food they need?

In that connection Dr. Filmer has raised the question of waste of skim milk in New Zealand. Recently I had occasion to make a rough calculation of what we could do. We could probably produce upwards of 100,000 tons of dried milk per annum without materially upsetting our farm economy or upsetting our collection costs. Where are we going to sell this? We have to realise that in pre-war years the various marketing countries told us they did not want dried milk, Britain in particular. Has a new viewpoint arisen in Britain? There is another aspect. There is no doubt that the people of the Far East, particularly Indians and the Chinese, need and could use milk products, possibly mixed with cereals such as rice. This would raise the protein content of the food and also the vitamin content; that would help the health of the people. Under existing conditions these people cannot afford to pay much. In 1937, of the 365 million people in India, probably not more than 2 million could afford to spend a rupee at a time (1/4d.) We talk here of distributing milk in pounds and half pounds - what about ounces and half ounces? Unless we are able to distribute these dried products at a low cost and in small packets, within the purchasing power of these people, there seems little possibility of disposing of this product. Within recent times great advances have been made in packing materials, and it is possible that it may be practicable to pack up very small portions of dried skim milk in our Far Eastern ports, that would make it possible to sell this at an anna a packet, providing these wrapping materials are useful. We could also help by reducing the fat content of our cheese and increasing the output of cheese by incorporating more skim milk. I don't see much possibility of exporting much dried skim milk under existing conditions. The competition between dried milk

and fluid milk, production of which is a monopoly of local markets, makes Governments impose duties on dried milks to protect fluid milk prices.

Mr. Callaghan drew attention to the great advantage we have had from pasture at the present time. In spite of the enormous advantages we have in growing pasture, we have not gone nearly far enough in supplementing pasture with our crops. Pasture has its disadvantages from a labour point of view and from a wastage point of view. We have the spectacle of stock being under nourished. I suggest there is a place for more intensive growth of supplementary feed, or crops that can be eaten directly by the animal, that don't necessarily need to be harvested. There is room for the development of a system that would make that possible. The one I have in mind is that, just as we have created co-operative dairy companies, why should we not have the creation of co-operative farmer service organisations which might co-operatively own large scale equipment and employ large numbers of employees to carry out arable work done at a small cost to individual farmers and much more efficiently, and done at low cost to the organisation. I don't see much hope at present, even with the provision of adequate labour, of increasing our food supplies on smaller size farms when it takes 3000 lbs. of butterfat to pay for a unit of labour. In future we want to see labour paid more. We want to see efficiency increased. I suggest that there is ample scope in that connection for the development of co-operative units or contract units that can work in with farmers to get a greater output from the land which we have.

Mr W.N. Paton: Regarding our inability to measure sufficiently accurately some of the things we are wanting to express - take Dr. Grange's map: the next step should be to devise measures to stabilise those areas as measures of our livestock production. How do we convert cattle livestock numbers into some common unit? Same with our sheep. We require the arrangement of statistical boundaries which will coincide in broad issue with the main features of such a map as that. There are vast problems confronting the statistician. It would help us very much indeed to have an expression of opinion as to what we might do to improve the position in that respect.

Mr. H.O. Askew: The person we have been considering is the ideal farmer who can produce at a high level. I am particularly interested in the average or below average farmer. I think the average of practically all sections of the farming industry is considerably below the maximum figures which a good man can show, and it seems to me that there is a big field of work to bring up the low grade man even to the present average. Whether that is to be done through instructional work to show him how to use his labour and fertilisers more efficiently and to make his cultivation more efficient or how that is to be done, I don't know, but no doubt all of them can be improved. Even by bringing up the below average farmer to the average, the production of the country would be enormously increased, perhaps more so than by laying too much stress on getting that extra 10% or 20% from the man who is already producing at a high level.

Regarding the matter of rehabilitation of farms. This is perhaps a matter of policy as to whether it is better or not to improve the farm which is handy to roadways, railways etc., so that the cost of transportation of the products of the farm is as low as possible. Is it better to improve those farms which have gone back, which at the present time are perhaps in the hands of elderly people who cannot work them as they might be worked - are those places to be improved, or are we to encourage people to go further back to open up new country with high transportation costs and small labour reward. This question of transportation lies at the base of a large part of our trouble.

Mr. Corkill: Regarding Mr. Callaghan's paper: His opinion of ploughing up the pasture and putting in a crop and then putting in new pasture - I think as a long-term project, his idea that pastures will be put down in certified strains of ryegrass is the important point. It would definitely increase the efficiency of pastoral production. For instance, pastures, as we know, are deficient in those periods May to September. At the present time we of the Grasslands Division are putting out a type of ryegrass which will fill in that period May to September. If that seasonal production could be improved, the pastoral industry would become definitely more efficient.

Mr E.P. Nielsen: Regarding the matter of the farmer himself: We have a tremendous scope there in improving our efficiency on the farms. We know that there is wide scope in the various fields that have been touched on, but we have to get back to the farmer himself. The thing that concerns me most is to see how we can improve his efficiency, make the farmer himself more efficient. We have a relatively small number of efficient farmers; how we are going to overcome that I don't know, but there is room there for improvement.

Mr. W.G. Whittleston:

(1) Following Mr. Nielsen's remarks about the need for improving the efficiency of farmers: I was at a farm growing wheat, the wheat was collected by using a header, then the paddock was set on fire. Surely it would not be a very difficult matter to plough in what was left of the wheat?

(2) With reference to the question of productivity of labour and the interesting fact that in New Zealand the productivity of the man on the land is greater than the man in the city, could Dr. Hamilton tell me whether the standard of living of the two classes of labour follows the productivity? It has been my fond impression that productivity is a general index of the standard of living of the community. The implication would be that the standard of living of the farmer is better than that of the man in the city. That is not believed on the land!

Mr. P. Sears: Dr. Hamilton, are there any economic snags about increasing production? We have heard about pasture strains that are pretty good. A lot of my farmer friends are very happy on their little farms without great production. If they cannot afford to over-capitalise their farms to get increased production, is it a favourable proposition to give positive aid, to give ploughing subsidies, or some sort of help, rather than straight out instructions. Some positive form of assistance towards these pasture types and crop types would help the farmer to do this.

Dr P.R. McMahon: The point regarding efficiency of farm production has been very much neglected by our research workers.

(1) What is the most efficient rate of stocking in most of our country? We have gone to a lot of trouble to develop new strains and we have gone to a lot of trouble to investigate many aspects of food, but we still don't know - in a country which depends almost entirely on pasture as a source of animal food, how intensity of stocking changes the efficiency of conversion of pasture into animal products.

(2) I would like to know whether, in terms of efficiency of money gain (or "enlightened self interest" as Dr. Hamilton puts it) there is an optimum in controlling the amount of effort which a farmer expends on the farm in terms of the output he gets from it.

MR. FAWCETT:

I have been very struck with the seriousness of the meeting, and I feel that all delegates realise the necessity of obtaining the optimum from all assets of the farm whether it be animal, land, or labour. I was very interested in the discussion on skim milk utilisation. I feel that in the utilisation of our by-products

for the production of pig meats we are certainly wasting a most valuable asset, and as time goes on I think we will divert it into some other channel which will be better suited to other countries requiring food. Pig meats may well become a drug on the market in a comparatively short space of time.

Regarding wool in relation to food production: the question of clothing was discussed in a very cursory manner at Hot Springs. The Conference did not deal specifically with it, but from the viewpoint of New Zealand, it is an extremely important point, and as suggested its future in relation to the economics of meat production cannot be ignored. Those who are thinking ahead, are extremely worried about the future of wool in relation to artificial fibres, and if wool is not saleable at reasonable prices, its effect on our farm economy generally will be dangerous. It may be one of the commodities which will go into what are known as "buffer stocks". The buffer stocks argument revolves round certain surplus commodities which would go into a reserve, probably under the control of a finance organisation and be fed out as and where required at prices which would enable them to be absorbed.

In regard to seeds for rehabilitation. Seeds of all varieties, particularly vegetable seeds, represent one of the stock piles held by UNRRA. That organisation is holding a stock of approximately 12 months supply for use of countries as they become freed from the enemy. Whether New Zealand can become an important unit in the production of vegetable seeds I would doubt after some of the experiences we have had over the last year or two. We can play an important part in the supply of certain farm seeds.

Referring to whether our produce is to be a gift or not: The support of UNRRA is in two forms. Half New Zealand's contribution is to be in the form of cash and the other half in kind. Certain countries will be able to trade on some of the cash contributed by other countries as well as that which they contribute themselves.

Your Chairman discussed the question of long-term policy and whether the industrial magnates would let other countries go ahead and develop. I don't think they can help it. We already see countries such as India and China developing rapidly on the industrial side, and whether the big industrialists like it or not I think that trend will continue and develop fairly rapidly. As it develops and as men and women are absorbed, so the question of wages will arise and the wages of these people will go up gradually - nothing can keep them down. Higher standards of living will come in these backward countries, probably not in 5 or 50 years, but the trend is there and gradually more and more people in these countries will be in a position to absorb the goods which we are able to produce.

DR GRANGE:

Mr. Grimmett's question as to whether we are attempting the Tennessee Valley methods to extend our ploughable land in New Zealand: I don't think that will happen. The limit of ploughable land is determined by slope entirely in the North Island. We have not got that problem of erosion on our rolling and flat country that the Americans have. Therefore we won't have to go in for the strip cropping and contouring. In the South Island there is the land that is ploughed though strongly rolling. There it is a case of returning to pasture. On the North Island map the outstanding thing is No. 6 class, the slate coloured area. We have to decide what is to be done with that country; what is to be returned to forest and what is to be held for sheep farming. With the setting up of Catchment Boards there will be an attack on that problem.

Regarding the difference in productivity between, say, Waikato and Taranaki: As Mr. Ward indicated, a number of factors cover it. I cannot contribute anything so far on the factor of soils. Taranaki is inherently more fertile; in the Waikato we are forced to topdress. The pasture men would reply that Taranaki pastures are inferior.

I would strongly support Mr. Paton. It is a very hard job juggling round heifers, cows, sheep etc., to get them into one unit.

MR. F.R. CALLAGHAN:

Dr. McMeekan raised the question of supplementary feed, the suggestion being that instead of renewing our grass through the supplementary feed crop, we would renew direct. I think it is a very moot point and one open for a good deal of discussion. Dealing with it purely from a crop or plant point of view, I know that you can go from grass to grass and get a good stand of better grass, but the use of the better strains of grass is costly and where one is spending up to £4 per acre for grass seed alone, I would suggest that this seed be put into the ground under the very best possible circumstances, so that it is given a really good start. One of the shortcomings of our farming in New Zealand and this especially applies to the South Island and where there are difficult seasonal conditions, is the lack of care on the part of the farmer to see that his seed bed is right. It is very hard to get a good seed bed with the ordinary implements that a farmer has on the class of country requiring renewal so that grass can follow grass. On many farms where pasture renewal is necessary there is every chance that stock under nourishment is also existing during the difficult months of the year. This feed shortage could be overcome by growing some sort of supplementary fodder crop which would draw on whatever plant food reserves were amassed in the old turf. The cultivation necessary for the feed crop and the time during its growth would permit of the soil mellowing down into a much better seed bed for the expensive seeding of certified pasture seeds.

Professor Riddet drew attention to the value of co-operation in New Zealand as a means of providing cultivation implements for farmers. A generation is growing up which know not the value of co-operation. It should be remembered that a farmer is a self-reliant man, and we should do everything to encourage his sense of responsibility. I think it would be a good idea for Dairy Companies to go in for the proposals being adopted by the Kaikōhe Dairy Company. That proposal appeals because, when it comes to the question of renewing pastures and growing supplementary pasture it is unlikely that many individual farms will be prepared to purchase £1000 of implements which will be necessary to achieve this.

Dr. Doak raised the question of improvement in vegetable seeds. In certain lines of seeds we have done very good work in recent years. With our rape seed we are now independent of importations. I feel confident that we can grow better strains of almost any type of crop and vegetable seed than those we are importing. Should we apply ourselves to betterment of the vegetable seed, we can make improvements, but these will have to compete with very low priced seeds produced under peasant labour conditions overseas.

It is not many years since great efforts were being made to get people to 'Eat more beef', 'Eat more butter', 'Drink more milk'. This was done at a time when millions in the world were suffering from undernourishment. It was then thought that technical advances of such magnitude had been made that all dangers of a food shortage were past - coffee was being burnt in Brazil, maize and wheat in Australia, Argentine were in vast surpluses. It is the question of distribution which always presents the greatest difficulty and no ready solution is yet evident.

DR. FILMER:

The questions that have been addressed to me have been under two headings:-

- (1) Those referring to utilisation of waste skim milk.
- (2) Those referring to proven sires.

(1) In regard to skim milk Dr. McMeekan suggests that accuracy of the figures should be checked, and I hope this will be done. I found it staggering to discover that we are wasting in our present use of skim milk and whey an equivalent in total digestible nutrients of the total output of fat lamb and cheese, and in proteins twice that.

Mr. Ward referred to the economics of skim milk. In Australia today skim milk powder is on the market for something just over £20 per ton, that is a little over 2d. per lb. It has 30% protein in it which works out at 7d. per lb. of digestible protein of highest biological value. With meat at 6d. per lb. you are paying 5/- per lb. for protein.

With regard to the Chairman's own question concerning the disposal of dried skim milk in India, if we could put it out in quarter pound packages at 2d. or 3d. for the $\frac{1}{4}$ lb. which should leave a big margin that would be equivalent to $\frac{1}{4}$ lb. of our best meat for 2d. or 3d., I can see no better method for supplying valuable animal protein to those who are most in need of it than by drying our skim milk.

(2) In regard to utilisation of sons of proven sires: Dr. McMeekan referred to progress made as a result of investigations by the Dairy Board, and I do hope that nothing I have said in my paper will be taken as a general criticism of that work. I am fully aware of the value of the work as a whole and the great contribution that it has made.

Mr. Ward's question in regard to the order of the five points I gave in a scheme for the utilisation of sons of proven sires. It is rather a question of cycle. I don't think one is more important than the other. The utilisation of proven sires and sons of proven sires in the industry should be concurrent with the utilisation of proven sires of the highest survey possible within pedigree herds. We require about 6000 sires for the industry, if we are going to use artificial insemination throughout which means that we only need about 1200 coming in each year, if we use sons of proven sires. They could be produced by 10 proven sires in pedigree herds. If we could only get our pedigree herds to use these 10 we would go a very long way in the problem of raising the genotype for production of dairy cattle.

Dr. Campbell asked whether I considered herd testing's main contribution is the proving of sires. I should pass that over to Dr. Hamilton. He has produced quite a lot of data, suggesting that herd testing does not assist very materially in improving production by any other means. In regard to whether it is then fair to charge the cost of herd recording up to the few who are using it:

- (1) if only a few continue to use it one would think that they would recover that cost in the premium they would get back from proving sires which will no doubt be great;
- (2) undoubtedly herd testing must be spread much more widely, and then the charge could be an industry one just as part of it today is an industry one.

There was a question by Dr. McMahon in regard to efficiency with reference to the rate of stocking. If we consider dairy cows, it does seem to me that a change in the method of expressing the results of G.H.T. would help materially. If all cows, irrespective of the length of time they were in milk were expressed in those averages, and a man knew that the average was for all the potential producers which were eating grass, then he would have some idea of the efficiency of the cows eating his pasture. With present methods he does get some idea of the efficiency of his producing cows when everything goes well, but it does not tell him very much about the efficiency of his general farming methods.

DR W.M. HAMILTON:

Mr. Ward raised one or two very awkward but pertinent questions which were touched upon by Mr. Callaghan. Taking the question: "Having been asked now to do all we can to increase food production, what happens at the end of 5 or 6 years - are we then going to have a glut?" Of course I can't answer that question; I think the answer lies in the success that attends the efforts of countries to maintain a policy of full employment. The difficulties in reaching that objective should not be underestimated. In a recent White Paper the Government in Britain have indicated that, if private enterprise fails to provide full employment, they will step into the breach and provide employment for those people who are not finding employment with private enterprise. That in itself immediately raises a doubt in the minds of private enterprise as to whether an investment is safe, and it is therefore, I think, quite likely to precipitate a state where you have not full employment. Personally, I don't think there is a half-way house between private enterprise and State enterprise; I think we have to make up our minds which we want; whether we prefer security with all the control which come with Government enterprise, or whether we are prepared to accept a higher, though possibly fluctuating, income under private enterprise. I think there is something wrong with a society which prefers security to progress. That is our choice. It raises a whole vista of problems. Above everything else, the thing that will determine the course of events will be the type of leadership which democracy is able to bring forward. With wise and sound leadership the advance can be maintained, but not if sectional interests are only prepared to see their own point of view, to the detriment of the national outlook.

Referring to the question of production in Northland, Waikato and Taranaki: I think there is one point worthwhile considering. The differences between these three areas are largely a question of their phase of development. Taranaki developed earliest; it got good roading facilities and developed a mass of small cheese and butter factories. The Waikato developed very rapidly after the last war, and the rapid phase of development in North Auckland was not until roading facilities were improved round about 1930. I think the differences in per cow production which exist today are largely differences in these phases of development; there are roughly 20 lbs. of fat per cow between them, and roughly 20 lbs. of fat between stages of development. I think North Auckland will continue improving and will catch up.

Dr. Campbell raised the question of productivity and efficiency in farming. It is interesting to discuss the reasons why primary industry in New Zealand is so much more efficient than in other countries. As Clark himself has pointed out, one of the major factors is the question of density of settlement and size of farm enterprise. In the older settled countries the number of male farm workers varies from 28 per 1000 acres of arable and pasture land in Great Britain to 157 in Belgium and 351 in Japan (the New Zealand figure is 8 per 1000 acres).