STATISTICAL AND SOCIAL INQUIRY SOCIETY OF IRELAND.

FUTURE POSSIBILITIES OF IRISH AGRICULTURE.

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(*Read on Thursday, 17th February,* 1938.)

"Young succulent grass is the prince of feeds. . . . Grass, properly used, ensures soil fertility; grass marries the soil to the animal, and the solid foundation of agriculture is the marriage of animal and soil."
PROFESSOR R. G. STAPLEDON, 1937.

The population deriving a livelihood from the land in this country is 50 per cent. of the total population. On the purchasing power of that section of the community the prosperity of industrial and commercial interests must largely depend. A few facts are adequate to indicate the deterioration in the farmer's position since the pre-war years. The average index number for the returns from agriculture in 1937 was slightly over the average of 1911-1913. In 1933-1935 the index number averaged 83.6, in 1937 it was about 101. In the absence of accurate information it is difficult to estimate the percentage increase in costs of production. Land annuities have been halved. Prices of agricultural implements and machinery have doubled; feeding stuffs have increased by 50 per cent.; rates and farm wages have increased substantially. The increase in the costs of those commodities essential to the farmer's household is almost certainly as great as the increase in the general cost of living index. These facts are sufficient to show that the position of the farmer and of those depending on him affords no grounds for complacency.

In a country lacking any considerable resources of raw material, with but a limited export trade in industrial products, but having a fertile soil and favourable climate, it is to increased production on the land that one must look for the resources to provide more wealth and a higher standard of living for the entire population. It is extremely doubtful if the volume of production has increased appreciably in the last quarter of a century. There is a real danger that production may diminish as a result of the disparity of price against cost of production, and as a result of the want of balance between economic conditions on the land and in urban or industrial employment in this country and in Great Britain. It is essential to counteract this tendency in time, and the need is so real as to justify exceptional measures of relief.

The necessity of relief measures makes it all the more urgent to examine whether it is possible to enable farmers to reduce costs of production, so as to restore the balance between costs and receipts, and thereby restore the balance of opportunity as between rural and urban employment. In my view, much of this object can be achieved

by a new technique of production, and at the same time a very desirable increase in production can be effected.

It requires a very considerable time, however, to investigate the economy under practical conditions of a new technique of agricultural production, and to carry out the work of instruction and demonstration, necessary for its adoption, if it is found to fulfil its promise. *The suggestions in this paper have, therefore, no direct bearing on present needs, but are, I submit, of considerable importance in the long-distance planning of our agriculture.*

As will appear later in this paper, whatever be the degree of self-sufficiency aimed at as regards agricultural products, by far the main production will be, in the future, as in the past, in the form of live stock, and live-stock products. Further, this production must be based primarily on grass, and by grass I mean grass and clover, whether cultivated or in the form of permanent pasture. In the improvement of grass and in its intelligent conservation for winter use lies the real hope of reducing costs and increasing production.

The fundamental problem in our agriculture and the hitherto unsolved problem is how to enable the farmer to produce on his own farm at a low cost, food in adequate quantities and of such high nutritional value—especially as regards protein—as will enable him to continue production the whole year round, whether in the form of milk from dairy cows, or as live weight increase of stock. At present nobody can fail to be impressed by the poor condition of our cows and store cattle in the late spring. As a result, our average milk production per cow is not much over 400 gallons per annum as against 700-750 gallons in Holland and Denmark. As a result our cows and creameries are practically non-productive for several months of the year. The reason for the low production of our dairy cows and for the poor condition of store stock in spring is the very inferior quality of the hay. The 40 inches of rainfall which enables us to produce such luxuriant grass makes it almost impossible to make good hay. I think when one considers the method of making hay in this country occasioned by the humid climate and high rainfall, it would not be too much to say that the average nutrient loss in haymaking amounts to 60 per cent. of the crop from the 2,250,000 acres in meadow. The hay is, on the average, a low-grade feeding stuff, with a very low percentage of the protein which is so essential for winter production. There is no hope of winter production on this basis. It is largely owing to the particularly bad quality of the hay in the winter, 1936-37, that butter production in 1937 dropped by almost 10 per cent. as compared with 1936.

Is there any way of conserving the surplus summer grass that can be produced in such abundance and so cheaply for feeding stock during the winter? Artificial drying, in its present state of development, does not offer hope of a solution for a country of small farmers. I have no doubt that the problem has been solved and solved in a way that admirably suits our conditions by the new technique of silage conservation, developed in recent years in Finland by Professor Virtanen. This process, involving the addition of mineral acids to the grass as it is packed in the silo, preserves the fodder with a loss of food nutrients of less than 10 per cent. and with negligible losses in protein. The result is that, taking equal weights of dry matter, the fodder fed out of the silo has the same feed value as the grass or

clover from which it is made. Butter produced from the fodder has the same colour and consistency as summer butter, and milk has the same Vitamin A content as summer milk—a matter of considerable importance from the point of view of public health.

The claims of Professor Virtanen have been independently confirmed by rigorous experiment in Finland, Sweden, Norway, Denmark, Germany, Holland, Switzerland and Austria. The process is in operation on thousands of farms in the Scandinavian countries where clover is mainly used, in Holland where grass is used, and in Germany, where a subsidy of 4 RM. per cubic metre of silo space is granted for the erection of silos.

Professor Virtanen has a farm near Helsingfors consisting of 75-80 acres of what we would regard as indifferent land. In 1936 it carried a stock of 25 cows, a bull, 10 heifers, 8 calves and 4 horses. The cows yielded an average of almost 900 gallons of 4 per cent. milk per annum. One cow yielded 1,160 gallons per annum. No food was purchased, and no nitrogenous fertilisers, the nitrogen being supplied by the clover and other legumes grown. No cow got concentrated food (oats, produced on the farm) unless when giving over three gallons of milk per day. I may add that the grazing season lasts only for four months, the cows being housed for the other eight months. Comparable results are being obtained on commercial farms in Finland.

On a farm of 72 acres in Holland, with no ploughed land, where grass is preserved according to Professor Virtanen's process, the stock consisted of 40 milch cows, 3 young cattle, 8 calves, 34 sheep and lambs and 2 horses. The average yield of the cows was 750 gallons, and the expenditure on concentrates was only 3.6 Dutch cents per gallon of milk.

The facts set out justify the view that a technical solution has been found for the fundamental problem of producing cheap winter food for cattle. The silos are inexpensive, the cost of the acid should not, with proper organisation, be a serious item. It is necessary to insist, however, that the raw material must be rich young grass or clover, which can be produced only by proper attention to the management and manuring of our grasslands. The raw material would naturally be grass on the rich grassland areas. On poorer and lighter lands, the crop should be cultivated grass and, above all, clover. There is opened out by the new technique a wide field of investigation on grasslands, on special crops suitable for conservation and especially on strains of clover and of nodule-bacteria most suitable to our conditions. There is scarcely a doubt that with our fertile soil and high rainfall, we could be placed in a particularly favourable position for production. The new technique is in line with old traditions of agriculture in this country. It would be based on the natural grasslands in the rich pasture areas, but it must be based on the plough on poorer and lighter land. The programme outlined does not preclude the use of other forage crops for cattle feeding. On the contrary, certain crops such as marrow-stem kale would add materially to the economy of production particularly on small farms.

My main thesis with regard to dairy and cattle production is that every effort should be concentrated towards the production of cheap feed on the rich pasture lands by proper fertilising, proper grazing and proper harvesting and preservation of the portion of

the crop necessary for winter use, and on the poorer land by cultivation of crops such as clover, marrow-stem kale, etc., which give heavy yields of green fodder rich in protein. This programme should adequately serve to put the whole business of dairy and cattle production on a more economic basis by enabling the cow to reach the limit of her productive capacity and the store beast to increase in weight during the winter months. It should economically increase the output per labour unit employed on the farm, and the total output on the farm.

Turning to the question of pig and poultry production, the raw materials are high protein animal products, such as skim milk and meat meal, cereal grains, mill offals, and potatoes. Skim milk is available in abundance in summer, and should be available the whole year, if the programme of fodder conservation outlined is brought to realisation. As regards the carbohydrate part of the ration, I would draw attention to the fact that in Germany the pig industry is largely based on potatoes. No country can produce such crops of potatoes as this, and, thanks to the admirable work of the Department of Agriculture, it is doubtful if there exists anywhere a higher technique of potato production than the best in this country.

I am satisfied that potatoes can supply carbohydrates at a lower cost than imported maize meal. The disadvantages are the difficulties and losses in storage. On the Continent, and especially in Germany, this problem is solved by storage in silos. The potatoes are washed and cooked by portable plants going from farm to farm. They are then packed in the silos where they can be stored indefinitely.

I am of opinion that the introduction of this system here would induce the farmer to pay special attention to his potato crop. The farmer has a healthy objection to " going to the shop " for what he can produce more cheaply on the farm and use the whole year round. The question of bulk limits the use of the potato to the extent of 65 per cent. in the ration for pigs and 50 per cent. in the case of poultry. The rest of the ration, except the animal protein, has to be supplied from cereal grains, mill offals, etc.

I repeat my conviction that the unsolved problem of cheap winter fodder for cattle can be solved by the new technique of grassland management and grass conservation, that the major portion of the requirements of pigs and poultry can be produced on the farm from skim milk and potatoes and that potatoes stored as suggested can supply cheaper carbohydrate feed than imported maize.

It is, I think, desirable that some attempt should be made, however imperfect, at a theoretical estimate of potential production of agricultural products in this country. The easiest way to approach the question is to assume a certain production, calculate the food units necessary for that production, and the acreage necessary to produce these food units. In order to simplify the problem, it will be assumed that all the food units necessary will be produced on the land, and that none shall be imported.

The first problem is to ascertain what production can be expected from our grasslands. Woodman of Cambridge has shown that an acre of Romney Marsh pasture is capable of producing 4,500 lbs. " starch equivalent " per annum. McConkey gives the yield of " improved " pasture in Eastern Canada as 2,940 lbs. starch

equivalent. This is in a region of fairly high rainfall, but with a relatively severe winter. Geith in Germany states that the average yield of the 20,000,000 acres of permanent pasture in Germany is not greater on the average than 1,100-1,300 lbs. starch equivalent. Germany, on account of poverty of soil and low rainfall, is not comparable as regards pasture conditions with this country. He states, however, that in improvement experiments carried out all over Germany on pasture that would represent the average of German conditions the following results were obtained:—

Starch equivalent in lbs. per acre.	Percentage of farms.
Over 4,400	7.5
3,300-4,400	12.5
2.600-3,300	20
1,800-2,600	40
1,300-1,800	15
Under 1,300	5

The average of these results would be about 2,600 lbs. S.E. per acre. Giöbel in Sweden has obtained with improved grasslands yields of 2,500-3,300 lbs. S.E. per acre.

In Finland it is reckoned that a crop of clover of 15 tons per acre in two cuts gives when preserved by Professor Virtanen's process 3,000 lbs. S.E. per acre. Yields of this magnitude should be easily obtainable here. The high rainfall, humidity, and favourable range of temperature make this country pre-eminently suitable for the growth of grass. In view of the results cited from countries where climatic conditions are far less favourable, an average yield of 2,000 lbs. S.E. should be obtainable here with reasonable management and manuring. In my estimate, however, I shall assume an average yield of 1,750 lbs starch equivalent per acre. The calculations on potential production are made on the following basis:—

(1) The food requirements of a beast of two years old is 6,500 lbs. starch equivalent, including 40 gallons of whole milk, 70 gallons of skim milk and 27 lbs. of meal as a calf, as well as 920 lbs. of meal in the last six months in the case of a fat beast. Of the 6,500 starch units, 5,860 are derived from pasture or fresh fodder in the form of silage or preserved or unpreserved green crops.

(2) A cow yielding 600 gallons of milk requires 3,500 lbs. starch equivalent per annum, of which all can come from pasture, silage, etc.

(3) A pig weighing 2 cwts. requires on the average 120 gallons of skim milk and 700 lbs. of meal.

A porker 80 lbs. dead weight requires 60 gallons of skim milk and 300 lbs. meal.

A sow requires 200 gallons skim milk and 1,800 lbs. meal per annum.

(4) A hen requires 10 gallons of skim milk and 75 lbs. of meal per annum.

A chicken requires one gallon of skim milk and 12 lbs. of meal till fat.

I assume the following production and stock:—

(*a*) An average production of 600 gallons of milk per cow per annum from 1,600,000 cows.

(*b*) An annual production of 1,400,000 two-year-old beasts, of which half are fat, weighing 10½ cwt.
(*c*) An annual production of 1,300,000 pigs and 400,000 porkers.
(*d*) An annual production of 5,000,000 chickens.
(*e*) A stock of 10,000,000 hens.

The food requirements will be, approximately:

1. *Cattle and Cows:*—
   (*a*) Pasture, silage and forage crops—
   Cattle: 1,400,000 × 5860 = 8,200 million lbs. S.E.
   Cows: 1,600,000 × 3500 = 5,600 ,, ,, ,,
   Total, say: = 14,000 ,, ,, ,,
   (*b*) Cattle as calves — 56,000,000 galls. whole milk; 100,000,000 ,, skim ,,; 350,000 cwts. meal.

2. *Pigs:* 1,300,000, say: 156,000,000 galls. skim milk; 8,000,000 cwts. meal.
   Porkers: 400,000: 24,000,000 galls. skim milk; 1,000,000 cwts. meal.
   Sows: 150,000: 30,000,000 galls. skim milk; 2,500,000 cwts. meal.

3. *Poultry:* 5,000,000 chickens, say: 5,000,000 galls. skim milk; 500,000 cwts. meal.
   10,000,000 hens: 100,000,000 galls. skim milk; 6,500,000 cwts. meal.

The total requirements of meal and milk would be approximately 56,000,000 gallons whole milk, 415,000,000 gallons skim milk, 19,000,000 cwts. meal, and in addition 5,600,000 cwts. meal for the fat cattle.

To provide the meal requirements the following cultivation programme will be examined:—

Oats	800,000 acres
Barley	200,000 ,,
Potatoes	500,000 ,,

Taking for the oats a yield of 16,000,000 cwts., allowing 10% for seed; 6,000,000 cwts. for horses and 400,000 cwts. for oatmeal mills, there is a balance of 8,000,000 cwts. for stock-raising.

Allowing for a yield of 4,000,000 cwts. of barley, with requirements for malting, seed, etc., of 2,500,000 cwts., there is a balance of 1,500,000 cwts. for feeding. The output of wheat offals is about 3,000,000 cwts., and of beet pulp 1,000,000 cwts.

Taking an average yield of 8 tons per acre of potatoes and allowing for seed and human requirements, there will be a balance of 2,800,000 tons, equivalent to 14,000,000 cwts. of meal.

The total meal equivalent available for feeding would be 27,500,000 cwts., which is adequate for the production outlined. The cultivated area under oats, barley, and potatoes would be 1,500,000 acres. The pasture, silage and forage crop requirements, assuming an average of 1,750 lbs. starch equivalent per acre, would be 8,000,000 acres. Allowing 1,500,000 acres for horses and sheep,

the production outlined could be realised on 11,000,000 acres, leaving an adequate margin for such crops as wheat and sugar beet.

There would be available in addition a very considerable surplus of skim milk for further production of pig and poultry products with imported maize.

In this estimate of potential production, the doubtful element admittedly is the assumed yield from grassland. It is based on experience elsewhere, in the absence of accurate information in this country. The assumed yield does not seem to be too high in view of the specially favourable climatic conditions. It would undoubtedly take a considerable time to achieve in practice, and would represent a very revolutionary change towards intensification of production. That intensification is, in my opinion, essential to agricultural prosperity.

The estimate of production has at least the merit of showing that there is room for considerable development. In order to make an advance, the first essential is to acquire under practical conditions the data essential to convince the farmer that the achievements of science during the last twenty years in the field of grassland management and conservation afford him a new way of reducing his production costs and improving his economic position. The farmer is a realist, and the example of the spraying of potatoes some forty years ago is adequate evidence that he will accept innovations if and when he is satisfied as to their economy. A programme of better grass production and utilisation will necessitate heavy expenditure on fertilisers. Credit facilities must be made available for their purchase as well as for the construction of silos and improvement of farm buildings. The economy of the whole programme must be demonstrated, and the demonstration must be based on accurate costings. Technical and economic investigation must go hand in hand, and must cover a wide field.

If there is merit in the views which I have expounded perhaps they may form the basis of an agreed programme of agriculture directed towards the improvement and increased output of live-stock products by better utilisation of our good grasslands, and by the extended use of the plough to produce better grass over wide areas, with increased cereal production as a natural consequence of crop rotation in that programme. In this direction, I think, lies the hope of lower costs, higher production and improved soil fertility.

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DISCUSSION.

Mr. Joseph Johnston proposed a vote of thanks to Dr. Kennedy for his most valuable paper. Dr. Kennedy, he said, like himself had the distinction of being a person, who talked horse sense about Irish agriculture. They appreciated the value of grass in their agriculture. In fact, he might say that their grass was in the nature of an emerald gem or pearl of great price. Their late lamented Minister for Agriculture had been referred to as the " Minister for Grass." He (speaker) hoped that in future references to the " Minister for Grass " were meant to be complimentary.

Production had diminished seriously in the last six or seven years and one of the indications of the fall was the use of raw material in cereal products, whether produced at home or imported. In consequence of the indirect effects of the Great War, production diminished from 1917 until it reached the minimum in 1922, when it rose and continued to rise until the discontinuance of the statistics showing total crop production. He expressed the hope that those valuable figures showing production in starch tons would be resumed. The downward trend in root crop production began six or seven years ago. There was an increase in the area under grass. Statistics of live stock showed that there had been marked stability from 1861 to 1899. In two important respects there had been substantial increases, viz., (1) cattle 2 years' old and over from 600,000 in 1861 to 1,000,000 in 1899, and (2) poultry from 8 millions sixty years ago to 22 millions. To-day they had fewer cattle two years old and upwards than at any time since 1861. The maintenance of their stock of poultry was only made possible by a bounty policy at the expense of the taxpayer. In more recent years the cost of feeding stuffs had increased so much that there was now wholesale slaughter, he was informed, among poultry and the total of 22 millions was reduced to something like 18 millions.

The production of oats and barley following 1932 had substantially diminished, a curious sidelight on the policy of restricting the import of Indian meal was that, while the production of oats and barley had diminished, a smaller portion of them was being used for feeding. The downward trend of agricultural production caused by the Great War reached a minimum level four years after the causes ceased to operate. The economic war has had a similar effect and even if it ceased to exist on the morrow the tendency to diminish production would continue and it would be four years before they would see an increase in agricultural production. If they could get to business on the lines indicated by Dr. Kennedy in his paper by giving effect to his programme over a long number of years they would be getting very much on the road to an increase in the volume of agricultural production. There would be certain inevitable consequences of that increase. In normal times they had to export one-half of their production and if they were to double their production they would have to export probably three-quarters of it. On the assumption that their population remained about the same they must become dependent on the export market. The departure from Free Trade in this country was not only economic folly but contrary to the teaching of the principles of religion. Anti-Free Traders told them to ignore the " talents "

which in the present case was grass. If Dr. Kennedy's programme could be set going it would provide employment for €00,000 agricultural workers.

Mr. F. P. Hussey, seconding the vote of thanks, said that Dr. Kennedy's voice was not that of one crying in the wilderness but one which insisted on being listened to. The opinion of most agriculturists was that the question of grass land had not gained the prominence which it deserved. Yet the Dept. of Agriculture was fully aware of the unique value of grass land. Dr. Kennedy, however, had done a service by bringing the matter to the notice of the public. Much had been done in regard to the wintering of cattle and storage of fodder in this country, and those matters had been prominent in agricultural investigations made in recent years. He did not know if the conservation of fodder were the key to agricultural prosperity, but he believed that the question of winter keep was a very important one for agriculturists and that it was receiving very considerable attention in Irish agricultural investigations for many years. In the institution with which he was associated the making of grass silo was a routine carried out with considerable success. Professor Virtanen's methods had been tried in this country at Glasnevin College, and his claims had been largely vindicated, but in his (Mr. Hussey's) opinion natural fermentation ensilage was more economical and cheaper from the Irish farmer's point of view. He doubted whether the Irish farmer would consider potato ensilage at less than £2 per ton would be profitable.

Professor G. O'Brien, associating himself with the motion, said he was in agreement with Dr. Kennedy's paper which was a most valuable one inasmuch as it raised major issues of agricultural policy in this country. In matters of this kind the economist, the technician, and the scientist, had to co-operate and there was no question but that from the economic point of view and in order to maintain a high standard of living they must export as much as possible. Whatever changes might take place in other parts of their economic life increased output and lowering of costs must be their objective ; if not, the standard of living would decline. In recent years they read that there had been great technical advances in the use of grass lands and of the great importance attached to grass. Money spent on research work in the policy suggested by Dr. Kennedy would be most beneficial and, however technicians might disagree, their differences of opinion indicated the need for research. It seemed to him that they had come to the parting of the ways—to the time when grass had become their principal crop and to the time for a thorough investigation not only into grass but into their peat, fisheries, timber and all their other products. Developments on those lines would lead to beneficial results. Employment would be increased by the utilization of grass lands. At that meeting he noticed there were present four members of the Commission of 1922, whose report was on those lines.

Colonel O'Brien said he would like to know if silos were in use fifty years ago ; what had happened since ? He had a number of cousins in England, who were engaged in agriculture and according to their audited accounts the production of grass drying was very profitable

Mr. Meyrick said that Dr. Kennedy's paper brought them back to the great principle of co-operating with what nature provided. Haymaking was a very precarious operation in this country, a great deal of it was spoiled by being left out too long and it took a long time to make and

was accompanied by great waste. Dr. Kennedy's plan might or might not be an improvement on haymaking. It would be dependent on the circumstances of the farmer. Farmers could not be suddenly rushed into precipitate changes, if so, he would be put out of action. The good farmer required a more independent and greater business outlook than any industrialists ; he had a whole series of little factories, so to speak, in his fields. There were probably a great many methods of making ensilage and they should be investigated side by side in order to ascertain the most valuable of them. It would probably take ten years' experimentation on the method which the Department would recommend to the farmer. That brought them to the point raised by Professor O'Brien, which would entail a great deal of money in the Estimates, One, however, felt sad when money which was being spent on an exotic crop like tobacco could be utilized to endow a magnificent research institute. It was difficult to make up their minds as to whether production had gone down. There was a great increase in the area under wheat. And on the other hand there was a serious decrease in the area under oats, and slight decreases in barley and potatoes. He did not consider the decrease in the acreage of oats could be compensated for by an increase in wheat-acreage and it was regrettable that anything should be done which would result in a falling away of oats production. An examination of statistics would show a steady increase in the production of potatoes. Thirty years ago a yield of eight tons of potatoes to the acre would be regarded as a dream. An expert, writing on the importance of grass manuring, points out that pasturage has been very much neglected and if Dr. Kennedy's paper resulted in increased attention being given to pasturage he would have accomplished great work, and the main impression which he (Mr. Meyrick) would like to be taken away from the paper was that they should not encourage any cutting of money set aside for research work.

Sir John Keane said he desired to stress the point which Dr. Kennedy had made about costings. He had put up silos which were now derelict. Why had those silos not become an economic proposition ? A lot of useful work could be done, as in industries, at research stations to convince farmers. Theories should be reduced to practice and in this connection he thought it very regrettable that the Dept. of Agriculture should have abandoned costings. To-day there was nothing to show the cost of beet or milk production. Danish farmers were so impressed by costings that they do the work voluntarily. It could be done in this country by a simple system of accountancy and the figures published. By doing so farmers would know where they stood.

Mr. James Dillon, T.D. said that while in agreement with Dr. Kennedy about grass land it should be remembered that intensive production of any crop impoverished the soil. The cost of artificial manures should be kept as low as possible. The maintenance of one or two factories at the cost of impoverishing the soil was lunacy. He concurred with Sir John Keane as to the advantages to be derived from having demonstration farms to which farmers' sons or their employees could be sent to obtain information. The majority of farmers would approve of such farms. Dr. Kennedy's paper would do an immense amount of good. There was, no doubt, that whatever was to the advantage of the agricultural community was to the advantage of all, and if they suffered to-day the remainder of the population would suffer to-morrow.

The President, tendering the vote of thanks, said the Society did not often have read a paper on which there was so much unanimity. The importance of the subject of the paper was very great, and there were fewer matters of greater consequence to the country. He would have liked to see not merely a reference to the prices and production of agricultural commodities but reference to the relationship between these and the cost of the raw materials to the agriculturist. He also desired to know the extent, if any, that the grass conservation method referred to had been utilised in this country.

Dr. Kennedy, replying to the vote of thanks, and the discussion on his paper, said he thought he could take credit for the initiation of investigations at the Albert College. He had studied the question continuously since and it was the unsolved problem of agriculture in this country. There were three methods of ensilaging, viz., natural fermentation on which there was a loss of 40 per cent. of nutriment, a development which started in Germany in 1921 and to which by the addition of molasses the loss of nutriment could be reduced to 25 per cent., provided the fodder was chaffed and there was a tower silo, and the Virtanen method which had been adopted in every country except England and Ireland. As a result of three years vigorous experimentation the Dutch Govt. negotiated to take over the process. Nothing more than a study of costings would make people realise where the leakages in ordinary agriculture occurred. In his opinion cow-testing without giving the cows the food which would enable them to produce their potentialities was worthless. He was one of the people who would have liked to see grass-drying plants set up in Co. Meath before migrants were sent there. Hay-making in this country produced a very inferior foodstuff. As to the suggestion about experiments on different methods of ensilage, Dr. Kennedy commented that all that had been already done in the past ten years, that life was too short and the farmer too poor for further investigations. As to the storage of potatoes, he believed carbon-hydrate could be produced cheaper from potatoes than from maize meal. Without maintaining and increasing the fertility of the soil the land was being robbed and after his twenty years' study and experience of this question, he submitted that the points raised in his paper were the basis of a prosperous agriculture and the basis of a prosperous country.