Welsh National Conference

convened by the Welsh Department of the Ministry of Agriculture and Fisheries

on the

Breeding and Marketing of Sheep

held at

ABERYSTWYTH,

on

Nov. 4th and 5th, 1931.

NOTE : Sheep breeders and others interested in the marketing of sheep and wool would be well-advised to obtain the "Orange Books" on these subjects, viz. :—

Marketing of Sheep, Mutton and Lamb. (Economic Series No. 29). Post free 10d.

Price 6d. net.

Wool Marketing. (Economic Series No. 7). Post free 7d.

Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2., and 1, St. Andrew's Crescent, Cardiff, or through any bookseller.

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PREFATORY NOTE.

The Conference at which the papers printed herein were read, was arranged on lines similar to a Conference on the Breeding and Marketing of Cattle held at Aberystwyth in 1928. Its object was to provide an opportunity for farmers and others interested in the sheep-breeding industry in Wales to consider and discuss some of the problems that confront them and to assist in arriving at means by which the Welsh sheep trade, which is of vital importance to the Principality, may be improved and developed.

There was a large attendance, including representatives of the various interests concerned, and many prominent sheep-breeders, butchers, salesmen, agricultural organisers and others took part in the discussion which formed part of the programme at each session.

During and after the Conference, many of those who attended expressed the desire to have the opening papers read at the different sessions made available in a permanent form. In response to this wish, the Ministry decided to publish the papers in the belief that their circulation will stimulate interest in what is admittedly a subject of special concern to Welsh farmers and be of assistance to them in formulating methods for meeting the requirements of the modern market under the conditions of soil and climate which obtain in Wales.

C. BRYNER JONES.
Welsh Secretary to the
Ministry of Agriculture.

February, 1932.

CONFERENCE PROGRAMME.

WEDNESDAY, NOVEMBER 4th.

BREEDING AND MANAGEMENT.

FIRST SESSION.—To commence at 10-30 a.m.

Chairman: Sir GEORGE B. BOWEN, K.B.E.,
Chairman of the Council of Agriculture for Wales.

Opening Statement: Mr. C. BRYNER JONES, C.B.E.

"A review of the sheep position in Wales and the outlook in Sheep Farming."

Professor A. W. ASHBY, M.A.,
Dept. of Agr. Economics, Univ. College, Aberystwyth.

SECOND SESSION.—To commence at 2 p.m.

Chairman: Mr. THOMAS WILLIAMS, J.P.,
Ex-President of the National Farmers' Union.

"Measures for improvement under Welsh conditions."

1. The improvement of Sheep and of methods of management for the production of Mutton and Lamb.

   Professor R. G. WHITE, M.Sc.,
   School of Agriculture, Univ. College, Bangor.

2. The improvement of Wool.

   Mr. J. A. FRASER ROBERTS, M.A., B.Sc.,
   Inst. of Animal Genetics, University of Edinburgh.

3. The improvement of Sheep Pastures with special reference to Hill Grazing.

   Professor R. G. STAPLEDON, M.A.,
   Director, Welsh Plant Breeding Station, Aberystwyth.

4. Welsh Mountain Sheep and the Live Stock Improvement Scheme.

   Mr. R. N. JONES,
   Superintending Live Stock Officer for Wales.

THIRD SESSION.—To commence at 5-30 p.m.

Chairman: Professor J. J. GRIFFITH, B.Sc.,
Univ. College, Aberystwyth.

"The Diseases of Sheep."

Mr. R. F. MONTGOMERIE, B.Sc., F.R.C.V.S., PH.D.
School of Agriculture, Univ. College, Bangor.

THURSDAY, NOVEMBER 5th.

THE MARKETING OF SHEEP, MEAT AND WOOL.

FIRST SESSION.—To commence at 10-30 a.m.

Chairman: Professor R. G. WHITE, M.Sc.

"The Marketing of Sheep in Wales."

1. The draft ewe and store sheep trade.
2. The fat lamb trade.

Mr. J. LLEFELYS DAVIES, M.Sc.,
Dept. of Agr. Economics, Univ. College, Aberystwyth.

"A further note on the Welsh Sheep Trade."

Mr. THOMAS LEWIS, B.Sc., M.S.,
Welsh Agricultural Organisation Society.

SECOND SESSION.—To commence at 2 p.m.

Chairman: Professor A. W. ASHBY, M.A.

"The organisation of the trade in Welsh Mutton and Lamb under the National Mark."

Major W. H. WARMAN,
Markets Division, Ministry of Agriculture.

"The Marketing of Wool."

Mr. J. MORGAN JONES, M.A.,
Markets Division, Ministry of Agriculture.

A REVIEW OF THE SHEEP POSITION

and

THE OUTLOOK FOR SHEEP FARMING IN WALES.

Professor A. W. Ashby, M.A.,
Department of Agricultural Economics,
University College,
Aberystwyth.

In any review of the sheep position in Wales at the present moment the most prominent fact in the minds of farmers will probably be that of the recent fall in prices of fat and store sheep, especially the latter. Their greatest interest then probably moves over to the question of future prices. Prices and necessary expenditure on the farm largely determine the income of the flockmaster, but a great deal depends on the forms in which expenditure is applied. Under ordinary circumstances profits from flocks are determined by some conditions which are under the control of farmers on their own farms, some conditions on the farms which are not entirely under control, and then some conditions in the markets. This Conference is intended to deal with all these conditions in so far as they can be dealt with in two days. I have to deal with the economic conditions, some of which are more or less confined to farms and some of which have a world-wide range.

If we examine the apparently simple fact of the recent fall in prices we shall find behind it a series of complex causes, local, national, and international. We may list some of the conditions affecting supplies and prices :—

British production and supplies ;
Imports, and conditions in exporting countries ;
Monetary conditions, and general industrial and commercial activities.

The present position of British total production can be stated quite briefly. Total numbers of sheep on farms in Great Britain are higher than in any year since 1916, or, if we go further back, than in any year since 1912. In England and Wales alone numbers are almost as high as in 1916. But in Wales alone the numbers are higher than have ever previously been recorded. The general trend of sheep population in Wales has been upwards while until recently the trend in England has been downwards. Indeed there are two general tendencies in sheep production over the world which seem somewhat conflicting. In Great Britain we have the tendency to shift sheep on to the pastoral areas where they are produced on the whole with less attention, certainly less labour, than in the arable or mixed farming areas, while in other countries which are developing the sheep enterprise the tendency is to intensify production, and carry it on by methods which require more and more attention and more labour. These

tendencies are not wholly conflicting. On the whole they result in placing the sheep flocks on improved rather than on poor natural pastures, and in connection with some crops which are easily grown to supplement the pasture feed. They are to some extent equalising conditions of production and they are very largely equalising qualities of products as they leave the farms. If Wales increases or maintains a big sheep flock on improved pastures, and supplements feed by some easily grown crops, she will be following a very widespread movement.

The recent marked tendency towards increase in sheep in Wales is a part of this general movement. We are told that there is a " production cycle " in the British production of sheep—a regular up and down movement—of 6 to 9 years. But I have grave doubts about the existence of any regular economic cycle in sheep production, and doubts about any cycle that is not partly accidental—as affected by the occurrence or non-occurrence of disease and as affected by changes in yield or " drop " of lambs. If there is any regular cyclical movement in sheep production it is probable that we have to look for its causes in climatic conditions some of which may be quite obscure, as well as in economic conditions in the markets. In Wales, however, we need not trouble about the idea of any cycle. There are sharp upward and downward movements in numbers of ewes and in total sheep but in each case we shall find special causes at work which are almost sufficient to account for them.

There have been these movements in recent years :

1909-13	down
1913-16	up
1916-20	down
1920-21	up
1921-22	down
1922-27	up
1927-31	fluctuating and finally upward.

One could almost say of Welsh flocks that had they not suffered the special disturbing influences of the war period, they would have shown a steady upward trend from 1913 to the present time, or at least from 1913 to 1927. In fact, the general trend of the ewe flocks in Wales since 1880—a period of 50 years—has been towards increase. Two of the main causes of temporary variations from this general trend are the occurrence of heavy disease losses from time to time, and variations in lamb yield from year to year.

Every farmer knows the effect of changes in yield of lambs on the numbers in his flocks, or on his sales. But there are seasons in which good or poor lamb yields are general, if not universal over the country. In addition to markedly good or poor lamb yields in certain individual years there are series of years in which lamb yield tends to be good or to rise, and also series of years in which they tend to be poor or to fall ; but these series are by no means regular and show no consistent cyclical tendency. Upward or downward changes in sheep population and supplies are partly caused by changes in the markets, but they are often accompained if not caused by changes in yield of lambs.

Individual years of poor yields of lambs, for instance, were 1913, 1917, 1919, 1928, and it is quite possible that the yields of 1913 and 1917 were as poor as any ever known. On the other hand, there was a remarkedly good yield in 1926, one of the best for 20 years. There was, in fact, a series of fairly good yields from 1921 to 1926, and in Wales a slowly rising yield during that period. The good yields of lambs in 1926 and preceding years had a great deal to do with the rise in sheep population up to 1927. And the falling off of yield in 1927 and 1928 was largely responsible for the small decline in numbers of sheep at that period.

In Wales, and more or less over the country, there was a remarkable series of falling lamb yields from 1907 to 1913, when they fell to the lowest points touched except for those of 1917 and 1919.

I am not dealing with this simply as a matter of interesting history, for it is exceedingly important in considering the future supplies. Nor would I accept any suggestion that these variations in lamb yields are important only on hill and highland farms. They may be a little more important on these types of farms, but to a very considerable extent they affect all farms.

In thinking of future supplies of sheep we have to keep in mind these variations in yields of lambs from year to year. Supplies of sheep are not entirely under control. We may reduce ewe-flocks by 5 or 10 per cent., but it does not follow that supplies of lambs in the following season will be reduced 5 or 10 per cent., or only in those proportions.

There are variations in yield of lambs per 100 ewes in Wales of the order of 10 per cent. between different seasons. The variation from one year to the next is of the order of 5 per cent., but when there is a series of poor yields the lowest will vary to 10 per cent. below the high point, or in a series of good yields the highest will exceed the low point by 10 per cent. or a little more.

Turning from the general supply situation for a moment we may note in passing that variation in effective yield of lambs (number actually reared per 100 ewes) from farm to farm *in the same season* is one of the important influences in the determination of the profits from flocks. Where store lambs, or fat lambs from June to August or September are reared and sold, variations in numbers produced per 100 ewes have considerable influences on financial results, and insufficient attention has been given to these variations and their causes.

After the general tendency to increase in the Welsh flocks, the next noticeable feature is the continued and almost steady decline in store sheep over one year old. The sheep flocks of Wales tend to consist more and more of ewes and lambs with the necessary rams, and there is a steady tendency towards the disappearance of all shearling sheep which are not required for the maintenance of the ewe flock. Everyone knows this, but not everyone knows how far it has gone or where it is leading to. In the 1870's there were as many as 100 shearling and two-shear sheep to each 100 ewes, and sometimes there were more. About 1895 there were about 75 sheep over one year old to 100 ewes. This figure has now been about halved. There are very few sheep over 1 year old on Welsh farms except those required to maintain the

flocks of breeding ewes and rams. After June of each year there are very few shearling sheep to go to the butcher. This tendency to get rid of the older store sheep has been going on for 50 years and will soon reach its limit.

The only areas which have sheep over 1 year old considerably in excess of the number required to supply theaves for the ewe-flocks are: Brecon, Radnor, Merioneth, part of Montgomery, part of Caernarvon; and a little part of Cardigan. In some of these areas in which the sale draft of prime ewes is heavy, a large proportion of theaves is required for the maintenance of ewe-flocks, and sales of yearling stores or fat sheep are smaller than would appear from their total number.

Some counties like Pembroke, Flint, Anglesey and Carmarthen do not keep enough sheep beyond the lamb stage to maintain the ewe flocks.

The results of this can be seen in the poor ewe flocks of some part of Pembrokeshire and Carmarthen, where the necessity of buying-in a new stock of ewes is avoided as long as possible. This separation of enterprises, lowland farmers using ewes for lamb production, hill and highland farms producing prime draft ewes, has good features when it is properly worked. But its success depends upon the continuation of a supply of good ewes from the hills, and the use of them. In some parts of Pembrokeshire where indiscriminate crossing tends to spread to the poorer of the ewe-raising farms results look quite likely to be very poor.

It is, however, very important to notice that this change in the constitution of the flocks has brought about a big change in the nature of supplies of mutton.

The Ministry of Agriculture's estimate of the proportions of supplies of sheep meat (numbers slaughtered) in England and Wales is as follows:—

	Pre-War. 1908-14.	1924-29
Ewes	19	19
Hoggets and fed lambs	47	64
Milk fed lambs	8	8
Other sheep	26	9
	100	100

These definitions are a little obscure. "Milk-fed lambs," presumably, are those taken from the ewes for slaughter before weaning. Fed-lambs are those from July to September or October, hoggets are those not counted as lambs slaughtered before shearing or up to the first shearing. But the big decline in the sheep of the shearling age and upwards from 26 to 9 per cent. of the total is very important.

One would have judged that the proportion of ewe-mutton in the total had increased. The figure of 19 per cent. may represent the position in the country at large, but the supply of ewe-mutton and of

the better quality of mutton of the shearling sheep is very unevenly distributed over the country—and even in Wales.

As I have indicated, the supplies of the better qualities of mutton from the older sheep are largely limited, after June of each year, to Brecon and Radnor, Merioneth, part of Montgomery, part of Caernarvon, and a part of Cardiganshire. In some other districts, as in South Pembroke, South Carmarthen, parts of Glamorgan, there is practically no choice of mutton supply after June. There are supplies of ewe mutton, and supplies of lamb, but there is nothing else until the winter fed 8 to 12 months old sheep came on to the markets.

As this question of definition of supplies has been touched we may note in passing that there is no satisfactory definition of lamb in the meat trade. A lamb, I suppose, is a young ovine animal that has not acquired its first pair of permanent teeth. But " lamb " for commercial purposes is meat of young sheep, usually less than 60 lb. deadweight, flesh of light colour, and bones soft or relatively soft. Farmers, apparently, have never given much attention to this question of the definition of " lamb." Although the description has a very definite value in the determination of prices, the definition of type has been left entirely to the meat trade. But it is not unimportant that when Scotch and Welsh carcases of much the same weight, of sheep of much the same age, meet in some English markets, the Scotch carcases are " lamb " and the Welsh are " mutton." It should be noted that supplies of New Zealand " lamb " are imported and sold retail in every month of the year, although imports are naturally much heavier in some months than in others. This continuity of offers of " lamb " has been an important factor in the development of the trade. Cold storage plays an important part in the regulation of supplies, but at the same time the imposition of the definition of lamb on the retail trade by wholesale organisation has been effective. New Zealand " lamb " is by no means all of the type that in home supplies is described as "milk-fed " or "Spring lamb." The description of meat of young sheep as " lamb " is itself of value so long as the meat is tender, light in colour, of good quality, and the bones are not too hard to allow the description to be applied. The classing of some of the meat of young sheep in Wales as " mutton " is a handicap, and it is not entirely deserved. The definition and classing of sheep meat as " lamb " or " mutton " cannot be said to be on firm grounds, for it depends as much on customs and conventions in the meat trade as on any standards of type and quality firmly defined and held.

Changes similar to those in the home supplies of mutton and lamb have also occurred in the imported supplies. The total consumption of mutton and lamb in 1930 was about 28 lbs. per head against about 29½ lbs. in the pre-war years, or as against the highest known figures of 30-31 lbs. per head. But in the last ten years consumption has ranged between 23 and 28 lbs. per head.

Total recent supplies of about 28 lbs. per head have been made up of approximately 15½ lbs. imported and 12½ lbs. home produced. Estimating on the available figures the supplies are about like this :—

	Home. lbs.		*Imported.* lbs.
Ewe mutton	$2\frac{1}{2}$	Mutton	$5\frac{3}{4}$
Milk fed lamb	$\frac{3}{4}$		—
Other lamb and mutton ..	$9\frac{1}{4}$	Lamb	$9\frac{3}{4}$
	$12\frac{1}{2}$		$15\frac{1}{2}$

This, however, is not quite fair to the home supply, and taking all the home produce comparable to the imported the figures would be about as follows :

	Home. lbs.	*Imported.* lbs.	*Total.* lbs.
Mutton	$7\frac{1}{2}$	$5\frac{3}{4}$	$13\frac{1}{4}$
Lamb	5	$9\frac{3}{4}$	$14\frac{3}{4}$
	$12\frac{1}{2}$	$15\frac{1}{2}$	28

Perhaps this does not tell quite the whole story. Up to 1923 more than half the imports consisted of mutton, and in that year about 51 per cent. were of mutton and 49 of lamb. In 1928 and 1929 about 60 per cent. of imported supplies were described as lamb and 40 per cent as mutton.

There have also been important changes in the *sources* of supply of mutton and lamb. In the years before the war (1909-13) nearly 42 per cent. of supplies came from New Zealand, but those supplies have now increased to about 49 per cent.—or say one half. At the same period nearly 26 per cent. of total supplies came from Australia, but this proportion has now fallen to about 11 per cent. The Argentine still holds about the same proportion of the trade, now about 29 as against 28 per cent. But on the other hand, other South American countries have raised their proportion of the trade from about 4 to about 11 per cent. of the total.

Total world flocks of sheep and potential supplies of wool and of sheep meat have been increasing. The increase probably continued until last year. The records of sheep flocks are poor, and not too reliable, but a general judgment is that sheep production reached its highest point for the time being during 1930, and that some decrease may now be expected. But it is only in respect of the wool supply that we are concerned with the total flocks of sheep. As regards mutton and lamb supplies we are concerned only with those parts of the world's flocks capable of producing the qualities of meat required in commercial consuming countries. These improved flocks may increase while flocks in general are diminishing as they have, for instance, in New Zealand. Nevertheless, a judgment based on the available evidence is that there are no grounds for fear of greatly increased imported supplies.

The dominant facts in the present situation are those of the heavy crop of home produced sheep to be passed through the markets, and the continuation of the low level of purchasing power of the industrial population.

Consumption has been increasing, but with a gradual lowering of prices. And it is improbable that demand can be stimulated and consumption increased, say to the pre-war level of 29 or 30 lbs. per head, without the attraction of even somewhat lower prices than those ruling up to the middle of this year (1931).

Prices of fat sheep have on the whole been satisfactory up to recent months—that is they have been satisfactory in comparison with prices of some other farm products. It was not to be expected that they would remain high while the general level of prices was falling, especially as supplies or potential supplies of mutton and lamb had been increasing. Some adjustment was almost inevitable.

There are some considerations regarding prices of mutton and lamb which are worthy of treatment in detail.

The demand for prime quality mutton and lamb of British origion arises from the relatively well-to-do classes; and, in the larger consuming centres, from persons who have decided preferences in consumption for the satisfaction of which they are willing to pay some premium in prices. It arises somewhat more generally in the smaller towns, especially where local supplies are fairly regularly equal to local demands. General consumers here are frequently willing to pay some premium to secure the home-produce.

Demand for " Spring " or " Milk-fed " lamb is of a luxury character. And demand for other lamb, from July to August onwards, also partakes of that character. Consequently, demand for these types of sheep meat is not affected so much by general purchasing power as demands for other types of meats. Demand here is affected by the purchasing power of people who mostly have enough to cover all their requirements in even the higher priced foods. As long as quality and attractiveness are maintained demand will continue. But it is exceedingly important to remember that when prices of fat sheep or wholesale prices of dressed mutton begin to fall, the prices of inferior qualities fall faster than those of superior or prime qualities. And when prices of mutton in general begin to rise, the prices of inferior qualities tend to rise faster than those of superior qualities. Also, a shortage of home-produced mutton and lamb has a greater effect in driving up prices than an excess in the supply has in driving them down. This is more marked in the case of prices of superior qualities than in the case of inferior qualities.

The explanation of this, in part, is that there is a fairly fixed demand for lamb and prime mutton which must be met as far as possible when supplies are short. Then when supplies increase, the home produce tends to press heavily on the demand for imported mutton and lamb.

On the whole, prices of prime quality mutton and lamb are less variable than those of inferior qualities.

There is a very practical application of these statements at the present time. While the supply of home produced sheep continues to be heavy, it is essential that fat sheep shall be well-finished. There is great danger in sending to market heavy supplies of sheep only half or poorly finished. Heavy supplies of poorly finished sheep are likely to push down prices to quite low levels.

Turning to prices of store sheep it is necessary to notice that they are more variable, more subject to somewhat violent fluctuations, than those of fat sheep. While prices of fat and store sheep are fairly closely related in the long run, they are not by any means closely related during short periods. Prices of stores are not only determined by conditions in the meat markets, but also by feed conditions on farms, by farmers' feelings, and by their supply of cash or credit. On the whole, farmers who buy stores from farmers who rear them are much poorer judges of market conditions, especially in the future, than the meat wholesalers, butchers, etc., who help determine the price of meat.

An illustration of this position is to be found in the over-valuation of sheep in the autumn of 1930, and possibly another in the under-valuation of stores during the last month or six weeks.

My judgment would be that farmers who have lambs and who are able to finish them will be well advised to do so, and that those who can run stores in good condition will be well advised to do so rather than offer them half-fat for slaughter. Also that people who have bought good lambs at recent prices are likely to make a fair margin on them.

Turning to the wool situation, we have the facts of heavy supplies of wool in recent years, relatively low demand for woollen textiles, and inactivity in the manufacturing industry. The trade in wool is in some respects unorganised, and information about stocks on hand is difficult to obtain. There is some disagreement amongst traders about present stocks. Some hold that total stocks scattered over the world are very heavy, others that the recent heavy supplies have mostly passed into use in spite of the apparent inactivity of manufacturing. But there can be no doubt that these views are coloured by the trading needs of those who hold them. Buyers wish to believe and create the belief in abnormal stocks available, and sellers wish them to believe that stocks are not abnormal. There can be no doubt whatever that stocks are heavy, and that they will impose a drag on prices for some time to come.

As regards Wales it is practically certain that stocks on farms are now quite heavy. Some, at least, of the farmers who hold them will wish to sell if there is any considerable improvement in prices. With improvement there will probably be considerable movement of wool from Welsh farms.

As regards British wool prices in general, part of recent weakness has been due to the low exports. In some years half the British wool is exported, but export demand was very slack in 1930, and quantities exported fell heavily. Exports to Germany, U.S.A. and Canada showed particularly heavy falls, and especially those to U.S.A. In particular, there was very little trade in carpet wools with the United States and this has affected the demand for the poorest qualities of Welsh wool.

The present exchange situation "going off the gold standard" is not likely to affect the price of mutton and lamb to any great extent. But it is almost certain to create more activity in the textile industry,

and has already made a difference. It is also nearly certain to stimulate the export of British wool to some extent. But in this connection it is necessary to remember that the selling pressure, in Australia and the Argentine in particular, is still very heavy; and that the exchange situation between these countries and the Continent of Europe is still in favour of buyers.

The present position is that the wool market has recently improved. Demand has been stronger, prices have been firmer, and have tended to rise a little. Some people have looked for a fairly considerable rise in the near future, but they may be disappointed.

The wool market is one that often moves very quickly—either upwards or downwards. And because of poor information about supplies, etc., these sharp movements cannot be foreseen very long before they occur. So it may be risky to judge what is likely to happen.

My view is that there is not likely to be any strong movement of prices during the remainder of this season, before the clip of 1932 comes to market.

Any great change in the markets for wool is dependent on one of two other changes—

either a considerable reduction in supplies,

or a very considerable improvement in general industrial conditions, in employment, and in the purchasing power of the working classes.

Smaller concurrent changes in each of these directions will have the same effect.

It is worth while noticing that the low price of wool, and of sheep skins, has had some effect on prices of fat sheep. Skins have fallen to half, or less than half of their value two or three years ago. Here again improvement in demand and prices is largely dependent on improvement in general industrial conditions.

The outlook for sheep is not as black as some people have painted it. Much depends on technical methods. If Welsh farmers could reduce the effects of disease on their flocks, even if they could not entirely remove them, the increase in revenue would be enough to pay interest on capital.

There is still much to be done on many individual farms in the improvement and better control of lamb yield.

In spite of considerable success in adapting supplies to market requirements, there is still much to be done in some districts. This will be considered at a later stage in the Conference and I need not dilate upon it.

Temporarily, special care is needed in finishing fat sheep for presentation to markets, and generally there is much to be done in using improved pastures for getting sheep and lambs forward, and finishing those intended for slaughter.

Summary.

Supplies and Markets.

British stocks are heavy.

General world stocks increased up to 1930.

The peak was probably reached in 1930, but statistical information is not sufficiently clear for final judgment.

Imports were growing up to last year.

Imports have been lower during the first nine months of this year.

I would not look for any immediate further increase in imports.

Realisation of present stocks on farms largely depends on methods of handling them.

Store sheep have recently been under-valued to some extent.

No general rise in prices of fat sheep is to be expected, although if a further fall occurs to the end of the year some rise should then be expected.

But sheep need not be unprofitable.

Technical Methods.

So far as it is possible to judge from the analysis of farm accounts and records the chief items of technical methods in which improvements are required are :

(1) Reduction in the death-rate due to disease, and general reduction of effects of disease on sales.

(2) Greater regularity and reliability of yield of lambs, and higher average effective yield on many farms.

(3) The improvement of "finish" of sheep, especially those marketed between late October or November and March.

(4) The production of crops for the improved finishing of winter supplies, and the improvement of grass-land for lamb-fattening in some of the newer lamb selling areas.

(5) Improvement in the choice of breeds or crosses for fat lamb production in some areas, and, more or less, a reduction in the number of breeds or crosses used.

All these will be dealt with more fully during the Conference and I mention them only as their consideration affects the general outlook for profitable maintenance of flocks.

THE IMPROVEMENT OF SHEEP AND METHODS OF MANAGEMENT FOR THE PRODUCTION OF MUTTON AND LAMB.

Professor R. G. WHITE, M.Sc., School of Agriculture, University College, Bangor.

I propose at the outset to devote a few minutes to demonstrating what I mean by improvement and explaining its relationship to the environment of the sheep. In doing this I shall base my remarks on a paper read by Mr. Hammond at Cambridge last summer.

In showgrounds we are often reminded of the old sneer that three quarters of what is called symmetry goes in at the mouth, but we have to keep a right perspective and remember that anything approaching showyard condition, or even good condition for the butcher, would be impossible if our breeds of live stock had not had their inherent hereditary capacity for meat production and fattening developed by the skill and work of generations of breeders.

It may be shown quite clearly that improvement for meat production is a real thing. No amount of feeding and no change in management would make the wild sheep an economic converter of good pasture into mutton, or render its carcase desirable from a butcher's point of view. Still less is it possible to induce the wild type to grow and "fatten" at the same time. Let us consider some of the changes which have been effected in the development of a good mutton sheep from its unimproved ancestors.

Characters of "Improved" Sheep.

1. Ability to convert grass or other food efficiently into live weight increase. The most striking character of the semi-wild sheep is its hopeless inefficiency as a converter of pasture into meat. Lambs and sheep of this type kept on good pasture and running with a flock of domesticated sheep seem to eat just as much, but to give hardly any return for it. I cannot produce any figure to show what the actual food consumption is, but I suspect that it is not far from being the same as that of a normal sheep of about the same size, and, as obviously it must be utilised in some way. I imagine that the greater part of the food taken in is wasted in the energy consumed by the wild, restless, roving habits of the animals. This has an important bearing on the management of mountain sheep.

2. The next obvious point in which our good mutton sheep surpass the wild or semi-wild sheep is in the proportion of valuable meat. Compare the legs, loins and backs of the two animals, or, if you prefer, start at the other end and estimate the proportions of the less valuable parts—head, neck, breast and shoulder. Whatever the system of feeding or management, the wild or unimproved animal could never be made to produce the sort of carcase the butcher requires.

3. Perhaps the most striking difference of all is the capacity for early maturity which has been developed in our breeds of live stock. In thinking of this early maturity it is most important to remember that the character includes, not merely ability to grow rapidly, but ability to change the shape rapidly, so as to produce an animal suitable for the butcher at an early age. The calf or lamb at birth has a large proportion of its weight in its legs, head, etc., and if it were killed when only a few days old, the proportion of meat available for the consumer would be less than half that from a fattened mature animal. In the wild or unimproved sheep, the body proportions remain somewhat similar to those of the young lamb, and, however long it may be fed, the carcase is never really a good butcher's carcase.

As we are considering improvements under Welsh conditions, I must point out that the great improvement made, e.g., in a Southdown, Leicester, Oxford, or Suffolk, in the three respects I have mentioned, has necessarily involved some sacrifice of other qualities which, though not so necessary under lowland conditions, are of vital importance on hill land. Among them are possibly milk production, certainly activity, independence, enterprise and natural instincts, which are essential for preservation on a poor hill grazing. In endeavouring to secure improvement in mutton qualities, we have to compromise to a certain extent, and at all costs to retain whatever measures of these wild characters are necessary to secure preservation and good thriving ability. Naturally, the better the grazing, or the more we improve it, the further can we push the improvement of the sheep for mutton production without running serious risk.

The Effect of Environment, particularly Nutrition.

As we are speaking of Welsh conditions, I will not apologise for giving most of my attention to hill sheep. I have referred to the great achievements of the men who were mainly responsible for raising our British breeds of sheep to their present position of pre-eminence as producers of mutton and early lamb, but it is necessary to point out that their work would have been almost impossible had their efforts and skill not been applied at a time when great improvements in feeding were being made. You will remember that Bakewell, the great pioneer in cattle breeding, and still more in sheep breeding, started his work about the time that the cultivation of turnips made possible the satisfactory winter feeding of stock. Similarly, subsequent breeders had the advantage of foods which had never before been obtainable. The effect of this was two-fold. Obviously, the existence of the new supplies of feeding material all round the year gave a great stimulus to the production of animals capable of converting these into a marketable product, but from our point of view there is another fact of even greater importance.

If development of the well-bred animal is retarded by inadequate feeding, not only is the growth checked, but the change in shape, or the change in body proportions, which a well fed animal rapidly effects, is also retarded, or even prevented, with the result that the

animal, though possibly possessing the inherent ability to grow into a prize-winner, retains much of the shape of its calf days. Illustrations might be produced to show side by side, animals of exactly the same breeding, the well nourished one growing into a most desirable beast, the badly fed one becoming an utter scrub. Yet, if we are to apply what we know of heredity, the hereditary constitution is unaltered by the treatment a particular individual receives, and, although there is an immense difference in the two animals, there would not, therefore, necessarily be any difference in their progeny, if given suitable feeding throughout. Now let us apply this to the case of mountain sheep and consider what importance it has for us.

There can be no doubt that on all mountain land at some time or other the sheep's existence is a precarious one, and it is therefore necessary to consider the effects of under-nourishment. Under-nourishment may be due to:—

1. Inability to secure a "bellyful" owing to the bareness of the herbage or its sparse distribution over a very scattered grazing;
2. Low proportion of minerals, protein or starch equivalent, so that the animal cannot get all it needs of one or more of these even if it does get a "bellyful." The capacity of an animal's stomach is limited to a certain quantity of dry matter a day, so that beyond a certain point it cannot make up for poor quality by increasing the quantity of food taken in.
3. Need to expend so much energy in securing or digesting its food that the net gain is little or nothing.

The effects of these on the size, rate of growth, and quickness of fattening are obvious. It is equally important for the breeder to remember that they also have their effect on the conformation of the animal, and I should like to apply the points I have raised with special reference to Welsh Mountain sheep, which have to live under the most severe conditions, though I imagine that the same remarks, to a less extent, apply to other Welsh breeds.

As you know, there is a Flock Book Society established for the express purpose of improving the mountain sheep which are one of the most important native products of the country. It is a cause of keen disappointment to many members of that Society that their efforts appear to be so largely disregarded by many of the ordinary mountain farmers, because it is really for their benefit that the Society exists. The mountain farmer (who is, I hope, well represented here to-day and will be able to give his own view later), says that the pedigree sheep may look very nice when dressed up in the Shows, but that they are not hardy enough for the mountain. In practice we find that in buying rams many mountain farmers select their rams from grazings distinctly poorer than their own, even though the animals secured are not of quite such a good class as their own ewes.

Looking at the matter in a purely detached way, there are two sides to this question, and both of them can be justified up to a certain point. On the one hand, many pedigree flocks, though descended from mountain stock, are kept entirely on lowland, and are fed very

differently from mountain sheep. Believing as we do that the inborn make up of an animal is passed on unchanged by the animal's environment or treatment, no particular harm is done by this artificial treatment, provided that we have some means of detecting and weeding out the less hardy individuals in each generation and retaining those likely to breed sheep suitable for mountain conditions. This is the difficulty. Even if all the sheep were selected originally from a hardy stock, the system of management on the lowland gives a good chance to all the lambs, so that the breeder must be extraordinarily skilful if he does not retain for breeding in each generation a few lambs of a less hardy character.

Therefore, while the environment does not affect the hereditary make up of the *individuals*, it may in a few generations make a great difference to the *flock*.

But there is another side to the picture. On a mountain grazing, even if the system of breeding is perfect, the natural conditions may often lead to the production of what I may term the "artificial scrub," i.e., an animal which has the inherent capacity for good conformation, but is unable to attain that because of the effects of under-nourishment. Here, again, there is a difficulty. How are we to distinguish the "real" scrub from the "artificial" scrub ?

We can, therefore, sympathise with the mountain farmer in his situation on the horns of a dilemma. If he buys a good pedigree ram which has been treated in such a way that its superior conformation has been clearly demonstrated, he has no means of knowing whether the ram also possesses "hardiness" or not. In buying such a ram he stands the risk of getting lambs which either will not live, or, owing to the lack of the food they require, will be worse than their mothers. On the other hand, if he goes to a poor mountain for a ram, he can make sure of getting hardiness, but he is unlikely to get one possessing really good conformation, and he has no means of knowing whether the ram if well fed, would have developed good conformation or not.

It may be said that the matter is of little practical importance because unless and until the mountain is improved, the size and conformation of the sheep will be determined by the nutritive value of the grazing. We are hoping that Professor Stapledon may give us help on this point, if not to-day, then in the future, but even if we have to wait a little there is a point of immediate importance.

The mountain farmer depends largely for his income on the sale of store lambs and draft ewes. The prices he gets for these is determined quite as much by the reputation they have for doing well in the hands of the lowland farmers as by their appearance in the fair when they come from the mountains.

The man who has a very poor mountain is likely to be disappointed that all his care in the selection of rams makes so little difference to the appearance of his flock, but if he is working on the right lines his bank book is likely to reflect the success of his efforts. The feeder of store lambs will be quick to note improvement, and the draft ewe

will not only develop and grow herself, but will produce a superior type of cross lamb.

What policy can one then recommend to the ordinary mountain farmer desirous of improving his flock ?

In the first place, if he has a fairly large flock, there is probably no need whatever to introduce new blood on a wholesale scale, and in most cases he should breed most of his rams himself. New blood should be introduced by the occasional purchase of a single ram. Apply the " progeny test." Mate the new ram with a number of marked ewes, which should be treated after tupping time exactly like the rest of the flock. If the lambs are satisfactory, keep the ram lambs for use in the main flock. This policy reduces risk to a minimum. The cost, concentrated on one ram, makes it possible to get a better animal than if six or seven are bought. The policy of line breeding makes it possible to build up a flock possessing uniformity and character suitable for the grazing.

The policy I have suggested presupposes that those breeders who possess land capable of bringing out the best qualities of their sheep should maintain ram breeding flocks, and I venture to address a few remarks to these. There might seem to be little need to urge the prime importance of developing the type of carcase likely to please the butcher, but I must confess that in the course of many discussions about types of sheep, I have heard many more arguments about colour of face, set of horns, etc., than I have about legs and loins, which are what the butcher is mainly interested in. I must, however, assume that breeders are fully alive to what the butcher requires, and I do not propose to discuss the mutton points of an ideal sheep in detail.

There is, however, one special point of supreme importance which is sometimes overlooked, i.e., capacity for milk production. The first few months of the life of the sheep are the most critical, and, unless the dam has a good supply of milk, the lamb will make a bad start, from which in all probability it will never fully recover. Considering the poor fare which a mountain, or even a hill sheep receives, it is obvious that the ewe must have great inherent capacity for milk production if she is to maintain her lamb on poor pasture, and the poorer the grazing the better must she be in this respect.

In the improvement of the lowland breeds to which I have referred many times, this point is of less importance because under lowland, and particularly under arable conditions, the milk supply of the dam is supplemented at a very early age by an ample supply of rich grass or forage crops, so that the lamb can make good for himself, deficiencies in the milk provided by the ewe. There is good reason for believing that the type of animal which produces an ideal carcase from a butcher's point of view, i.e., the thick, very compact, short-legged type of animal, is relatively inferior for milk production. On the other hand, the more loosely built, lengthy rather narrow-fronted animal, which so often is excellent for milk production, is not the most desirable from the butcher's point of view. In considering the improvement of mountain sheep, we must take care that in aiming at an improved

carcase we do not lose milk character and thereby lose our sheep. Apart from the importance of milk for the rearing of a lamb on a hill, we have to remember that the receipts from the sale of draft ewes are among the biggest items in the hill farmer's income, and there can be no doubt that the relatively high price which Welsh ewes of various types command is very largely due to the reputation they have as milkers and mothers. At all costs that must be maintained. We have, therefore, to try to strike the happy mean and to develop something corresponding to the dual-purpose type of cattle.

How are we to develop and retain milk character while attending to the improvements in other respects ? In the case of cows we have our Milk Recording Societies, but, so far, the Ministry have not overcome the difficulties which would be encountered in keeping milk records of sheep. We can form a very good idea of the milk production of the ewe by careful observation of the growth and development of her lamb or lambs. This applies particularly to ram breeding flocks. Such flocks are usually kept under better conditions than the ordinary hill, and, whatever the breed, one is entitled to expect more than 100 per cent. of lambs. Generally under such conditions about 50 per cent. of the ewes may be expected to produce twins, and it is to the twins rather than to the single lambs that one should give special attention. Under such conditions it is a very poor ewe that will not do a single lamb well. But rearing twins is a different matter and in many cases their growth is limited by the fact that the ewe is incapable of producing all the milk that they could utilise. The most useful test of milk production in a ram breeding flock such as I have assumed is, therefore, to compare the twins with the single lambs. If there is comparatively little difference between the single lambs and the twins, it may fairly be inferred that the ewes in that flock are good milkers, and it is from such a flock that rams should be selected.

In selecting lambs to be kept for breeding purposes, too often the plan adopted is to select simply the best and strongest, with the result that the majority of the lambs so selected are singles. It would be far better policy to put the single lambs on one side and to select the best of the twins. At any rate, in making the selection, twins should be considered separately and not pitted against the single lambs.

In this connection, I may say that I consider the ram lamb business one of the worst points about our system of ram selection. For some reason or other the great majority of buyers will buy a ram lamb in preference to an older sheep. This is attended with many evils. 1.—In the case of a mountain breed it tends to favour the production of a type of sheep not likely to do well under poor mountain conditions. 2.—There are very few breeders capable of judging the real merit of a young ram lamb. I hesitate to say that it is quite impossible, but I will readily admit that it is quite impossible for me, and I think also impossible for most of the breeders I know well. 3.—The ram lambs that look best in the autumn sales are almost invariably single lambs. There is, I think, some ground for saying that prolificacy and milk production are associated, and, while we do not want many twin lambs on the mountain, if we breed

constantly from single lambs obtained from farms where conditions are good enough for the production of twins, we stand a fair chance of reducing the milk production as well as the prolificacy of the flock.

Early Maturity.

Connected with this question is the problem of early maturity. In lowland flocks breeders often deliberately use ram lambs, as thereby they are sure of getting animals capable of rapid growth and development. On a hill the case is different. If we breed for rapid growth and development, we may get a lamb which looks well in autumn, and possibly even in the following spring, but when turned up to the mountain as a yearling in April it is very likely to fall behind. It is no use promoting the rapid growth or developing a frame so large that the animal on its poor grazing has no chance of securing the material necessary for covering that frame with meat. Again, therefore, it is necessary to be careful and not push to extremes points which are of value to the butcher, but whose development tends to lessen the animals' ability to thrive under the conditions for which they are intended.

The subject selected for me to speak on includes improvement in methods of management as well as the improvement of sheep, and from what I have already said it will be obvious that the two must go together.

From both points of view, one of the things most urgently needed in many parts of Wales is better regulation of the common grazings, and I should like to make it clear that I use the term common grazing, not in its legal sense, but to describe every type of grazing on which the flocks of different owners graze together. In most cases there are regulations, but they are not properly enforced. The result is than many of the grazings are over-stocked, which has its obvious effect in causing under-nourishment and its accompanying effects of restricted growth, bad conformation and liability to disease.

Then most of us who turn sheep out on such a grazing suffer every year from the occurrence of stray rams, which are usually utter scrubs, and in any case often serve the ewes before the regular tupping season and cause loss of lambs which arrive unexpectedly early. County Patrol Shepherds ought to be empowered to deal summarily with such animals.

I do not want to anticipate anything that Professor Stapledon may say, but there is one point that cannot be too strongly emphasised, viz., the importance of proper regulation of the grazing, which is impossible without proper fencing and sub-dividion of grazings. On a large grazing, even if the total area is ample for the sheep stock, there is serious danger that parts of it will be overgrazed and less favoured parts neglected, so that, although a small stock is carried, the evils accompanying overstocking may be experienced. In some cases a great deal could be done by careful shepherding, but nothing is so effective as sub-division by suitable fences. Wire fencing of all kinds is now so cheap, and the effects of systematic regulation of the grazing

are so great that, even if no other effect attended this Conference, it would be a very happy outcome if the result were a substantial increase in the number of divisions of hill land.

THE IMPROVEMENT OF WOOL.

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I am very glad to see that in a later session of this Conference Mr. Morgan Jones will be reading a paper on the marketing of wool. It is clear that a logical arrangement demands that a discussion of marketing should follow a discussion on production, but I confess that I wish that his paper could precede mine. I am sure that anyone who is interested in any phase of agricultural production realises the immense importance of improved marketing, and further, I doubt whether there is any sphere of production in which this is more important than in the case of wool. At the present time, quite apart from very low prices, the farmer may very well ask whether he is going to receive a due reward if he does improve his wool. For the purpose of this paper I am going to take the point of view that this difficulty will ultimately be surmounted, that improved methods of marketing will be developed, and that if the farmer does improve his wool clip he is going to find that it is profitable for him to do so.

Wool differs from most other agricultural products in that it is used for a great variety of purposes. All the wool in the world, from the finest to the coarsest, ultimately finds its appropriate use. It is not so easy, therefore, to talk of better wool as it is to talk of better meat or better milk. This difficulty, however, need not affect the farmer so much as it affects the manufacturer. The farmer's criterion of better wool can be made a simple one, namely an increased price. It is a fact that, over a period of years, finer wool and wool marked by other desirable characteristics commands a higher price than wool which is coarser and which does not possess those other characteristics that make it suitable for the manufacturer of the more expensive materials. If we take a single breed we see this very clearly. The fleece is sorted into different "sorts" and in the case of many breeds the main characteristic which determines the sort into which a particular piece of wool is placed is fineness. What are called the better sorts are always quoted at a higher price than what are called the poorer sorts. It may be the case that at a given moment there is a greater demand for the lower sorts, but even so sheer decency demands that the quotation for the higher sorts should still be kept fractionally higher, though perhaps for a time little wool of the higher sorts may be changing hands. From the point of view of the farmer, therefore, there is an order of value more or less fixed as between the wool of different breeds and as between different fleeces of the same breed and as between the

sorts into which the fleeces of a single breed are sorted. If the farmer produces more of the better sorts and less of the poorer sorts he is producing improved wool.

The question may fairly be asked at this point whether there is a danger that if a great deal of the better wool is produced and much less of the poorer, the poorer which, of course, has its special uses, might become scarce and therefore actually the more valuable. I think it would be generally agreed, however, that this danger is very remote. There is so much bad wool in the world that enormous changes would have to occur before this point was reached. Further, wool is often used for a particular purpose because it will do, not because better wool would not actually be better for that purpose.

How is better wool to be grown? Clearly only by the farmer's own efforts. It is necessary that the breeder should look at the wool of his sheep with some of the same knowledge and interest with which he looks at all the other points of a sheep. In principle there is no difference at all between improving sheep from the point of view of wool and improving them from any other point of view. One of the greatest advances in livestock breeding that has ever occurred has been that in connection with the breeding of sheep in Australia. In this country little has been done, and for that reason the possibilities of improvement are very great. The sheep breeder of to-day is in much the same position as the Bakewells and the Collings of the past; enormous possibilities still lie before him. But it is absolutely necessary that the breeder himself should be able to appreciate what a better fleece is. It is true that he can receive a certain amount of guidance from the manufacturer, much as he can receive guidance from the butcher in the case of meat production. But he must not expect too much. The breeder has to look at the entire fleece of a sheep; the manufacturer never looks at an entire fleece. The different sorts into which a fleece is divided will, in all probability, be used for totally different purposes. During manufacturing processes many mixings occur until ultimately the connection between the raw material and the finished product is extraordinarily remote. To expect the manufacturer to explain exactly what sort of fleece a sheep should have is rather like asking the proprietor of a city quick-lunch counter his opinion on the relative merits of Welsh and Galloway cattle as ingredients of the mid-day mince.

There are certain general principles in the utilisation of wool, and with some knowledge of these it is possible to decide that the fleece of one sheep is better than the fleece of another. An attempt to go beyond that would probably only result in confusion. The sorter sorts a fleece in relation to a few comparatively simple characteristics, and on his sorting depends essentially the value of the fleece. What the breeder has to do is to find out what those characteristics are and then develop them in his flock.

There is another reason for exercising caution in not asking the manufacturer too much, and it is a point about which a good deal of confusion may arise. Breed names in Bradford may not mean the same thing as they do to the breeder. A Welsh fleece in Bradford is not necessarily a fleece grown on a pure-bred Welsh sheep, but

is a fleece that possesses certain characteristics recognised in Bradford as Welsh. The best Welsh fleeces would probably not be called Welsh at all, but fine Shropshire. A manufacturer is sometimes very surprised when he is shown a good pure-bred Welsh fleece. Often he does not really believe that it is Welsh, but ascribes it to a cross, and incidentally there appears to be amongst wool-men a curious conception of the crossing of fleeces which appears to have nothing to do with the crossing of sheep. I believe I am correct in stating that from the point of view of the wool-man the Ryeland breed does not exist. In case the Welsh sheep breeder should feel unduly elated by the fact that he produces a number of fleeces that are considered so good that they are not called Welsh at all but fine Shropshire, one has to point out, on the other hand, the regrettable fact that many fleeces are produced in Wales which are not good enough to be described as Welsh and would, in all probability, be classed ultimately as Scotch.

Before considering in detail the characteristics that should be observed in the attempt to breed better fleeces, a word or two may not be out of place from the general point of view of how better fleeces can be produced. One of the most successful Australian stud breeders said to a colleague of mine: "Tell me what sort of fleece you want and I will breed it for you." Probably there is no feature of animal production that can be more thoroughly and radically controlled by breeding methods. The sheep breeder can, within wide limits, make the fleece anything he likes.

We have said that little has been done in this country. The reasons for this are three-fold. In the first place, the breeder is not sufficiently interested and often does not know the points to look for. In the second place, he is often afraid that in breeding better wool he may injure the constitution, the hardiness, of his stock. In the third place, in this country mutton production is much more important and he is afraid that if he alters the wool of his sheep he may make them poorer as mutton producers. There is a fourth consideration that would arise immediately serious wool improvement was undertaken. This is weight of fleece produced per sheep. One might point out that the second consideration—the maintenance of a good constitution—is not a difficulty particularly associated with wool production. It applies to everything else in animal breeding. The Australian sheep breeder has made enormous strides in wool improvement, but any Australian breeder would say that the first and most important consideration is the maintenance of constitution. Wool improvement can be effected without impairing constitution. If it is found that constitution is being injured, then that avenue must be regarded as definitely closed.

I should now like to consider briefly how the breeder of Welsh mountain sheep might improve his clip, and in this discussion we must bear in mind very carefully the importance of maintenance of constitution and the primary importance of mutton production.

Welsh wool is sorted into five sorts, the main points the sorter looks at being (1) quality, which essentially means fineness; (2)

kempiness; (3) (rather less important) length of staple. There are five sorts:—

(1). Diamond. Welsh diamond has to be very fine and almost entirely free from kemp. It must also be short. Welsh diamond is an essential ingredient of the best and most expensive tweeds.

(2). Pick. This is almost as good as diamond and is used for good tweeds.

(3). Super. This contains more kemp and is coarser. It is used largely for the manufacture of blankets and flannels.

(4). Middle. This contains more kemp and is still coarser. It is used for rather lower grade blankets and flannels.

(5). Britch. This is long, coarse, hairy and kempy wool. It has many of the characteristics of Blackface wool and is used for carpets.

We have seen that very good Welsh fleeces will often be classed as fine Shropshire, and it might be asked whether, if a great improvement were to occur, so many Welsh fleeces would come into the fine Shropshire class that there would be a shortage of Welsh and that the price of Welsh might increase until it was actually higher than Shropshire. This is a most unlikely event in any case, but actually it could not happen. If Welsh wool were ever to become more valuable than Shropshire, the fleeces would of course, once again be classed as Welsh.

In spite of the complexity of the utilisation of wool we can see, therefore, that by paying attention to certain simple characteristics an enormous improvement could be effected.

In the first place, fineness of fleece. Welsh mountain fleeces show enormous variation in this respect, ranging from fleeces which are as fine as the Southdown to fleeces that are as coarse as the Blackface. Simple selective breeding could rapidly increase the fineness of the wool clip. In our observations and experiments at Bangor, however, we have found that it is rather difficult for the non-technical person to estimate degrees of fineness. Of course, extremes are readily perceived, but the difficulty in the case of more average fleeces is that they frequently consist of a mixture of coarse and fine fibres, and in practice, it is difficult to estimate the average by eye. We have found, however, that for a long time to come, at least, it would not be necessary to look at fineness directly in order to secure a very great improvement. All that is necessary is to select short fleeces. If the breeder of Welsh sheep will only select strongly in favour of short fleeces, he will automatically secure a great improvement in quality. He will be producing fleeces that will give a much greater proportion of the better sorts. The breeder may now ask whether short-woolled sheep are as suitable for Welsh mountain conditions as long-woolled sheep. Will they be as hardy? It is difficult to give an absolutely clear-cut answer, but I think that the indications are that they should not be less hardy. In the first place, they need not have poorer coats at birth (that is a point essentially associated with kempiness), and from the point of view of the penetration of rain it appears to be the case that it is the long, hairy, open fleeces that are faulty in this respect, and not the close, short type. The breeder of Welsh

sheep may associate the coarse fleece with hardiness. The breeder of Blackfaces does not. The show type Blackface has an exceedingly coarse fleece, but the commercial breeder whose sheep live under difficult mountain conditions says that the show type rams are not suitable for his conditions and, in fact, his sheep stock will have far finer fleeces. As regards weight of fleece it is true that, on the average, the shorter fleeces will weigh slightly less than the long ones, but this difference is not as great as might be supposed. What the short fleeces lack in length they largely make up in increased closeness.

The second point is one which does not affect the manufacturer directly, but is of great importance to the breeder. This is density of fleece which is important both from the point of view of securing increased fleece weight and increased protection for the sheep against bad weather conditions. Australian experience shows that this characteristic of a dense fleece is one that can be enormously developed by selective breeding. The Australians have been able to increase weight of fleece from, say, 9 lbs. to 30 lbs., and I believe that a great deal of effort in recent years has been directed towards securing great density. Enormous sums have been paid for rams that have notably dense fleeces, even though in other respects they were not very good. Of course the Welsh sheep breeder would not wish to push wool production to this extreme: he might injure mutton characteristics if he tried to do so, but no doubt a very considerable improvement could be effected without any ill effects.

In the case of the Welsh sheep, kemp is of special importance. It is probably about equal in importance to wool quality in the sorting of fleeces. At this point one must not perhaps listen too readily to what the manufacturer says. Manufacturers often say "Why try to get rid of the kemp? Kempy Welsh wool finds a ready sale." So it does, but at a proportionately lower price. It is true that there is a certain demand for kempy wool for making into rough tweeds, in which the kemp is needed. But the great bulk of kempy wool is simply used for purposes in connection with which kemp does not matter much, as it is cheaper than a non-kempy wool of similar characteristics would be. It is quite certain that whatever improvements are effected, there will be plenty of kempy wool available for the purposes for which the kemp is really necessary.

Many Welsh sheep breeders are of the opinion that the presence of kemp is associated in some way with the hardiness of the sheep. It is most doubtful whether this is an essential connection, except in regard to its association with a thick birth coat. There are a number of general considerations which would point to fine wool rather than kemp being associated with arduous climatic conditions. From the evolutionary point of view fine hair or fine wool may be regarded as a response to conditions of extreme exposure. Coarseness of coat, on the other hand, is associated with warm climates. But the breeder will have to watch the birth coats of his lambs most carefully if he selects against kemp. The position is this. The type of Welsh lamb which has practically no thick birth coat at all but is very like a Southdown lamb will never develop

a kempy fleece. The type of lamb which has a thick, hairy birth coat all over may or may not develop a kempy fleece—most of them will. Simply to select against kemp, therefore, would mean a rapid multiplication of badly covered lambs. The breeder, if he wishes to improve the fleeces of his sheep in respect of kemp, will have to select for two things at once—a thick, hairy birth coat and an adult fleece practically free from kemp.

The points I have mentioned are quite simple and straight-forward ones, and they are probably much the most important in connection with Welsh wool improvement. There is, however, one additional point which is also of great importance. This is the question of red kemp. Red kemp is particularly objectionable to the manufacturer. We have seen that the third and fourth sorts which form the bulk of the Welsh clip are used principally for making blankets and flannels—that is, they are made into undyed cloths. The disadvantage of coloured fibres, therefore, is much greater than would be the case if the material was to be dyed. If the Welsh sheep breeder were making a really determined effort to secure a very marked improvement in wool production he would probably have to alter the breed standards. The Welsh breed would have to become white faced. I do not mean by this, pink nosed, but simply that the brown colour on the face should disappear. Probably, however, this is asking too much, and in fact considerable improvements could be made without this change. In the first place, any measures that tended to reduce kemp in general would automatically reduce the red kemp too. In the second place, it might be possible to select against those lambs which showed a great deal of brown in the birth coat.

I have not emphasised yet the fact that Welsh wool is a particularly valuable type of wool. It possesses a special softness to the touch which makes it particularly suitable for the manufacture of the very best sorts of tweeds, and in the case of blankets, imparts to them what the manufacturer calls "life." The breeder of Welsh sheep can rest assured that in improving the Welsh clip he is improving something of real value at the present time and something of much greater potential value. It may be worth pointing out that our experiments at Bangor point to the conclusion that improvement along the lines I have suggested would not impair this softness of handle.

I have taken the Welsh breed in detail, but much of what has been said is also applicable to the other breeds found in Wales. Kemp, of course, is not an important feature in them. Perhaps Kerryhill breeders would say that it never occurs in the Kerryhill. I would only suggest that if they do happen to see it, they should select rigorously against it. But apart from kemp the method of approach is essentially the same in the case of the other breeds.

The points I have taken have been simple. There are, of course, others; for example, uniformity of fleece, but I am confident that any breeder who became interested in the wool of his sheep would soon develop an eye for the fleece that would enable him to see not only the simple points but many others as well.

One cannot pretend that there are not difficulties in the way in relation to present sheep breeding practice. Shows are held at a time of year when the sheep have only a short fleece, but worse than this, show sheep are clipped at an unnatural time, and every effort is made by the shepherd to ensure that the fleece looks as different as possible from what it really is. The breeder who is interested in wool would find it a difficult matter to judge the fleece of a show sheep. If the show-yard mechanism is to be used at all in connection with fleece improvement, it is most desirable that the buyer should be able to see sheep with fleeces in an absolutely natural condition. Another practice that is far from helpful in judging the characteristics of fleeces is that of clipping ewe lambs before they go away to the winter grazings. In fact, anything which alters the fleece makes it more difficult for the breeder who is interested in wool to effect improvement.

I could not possibly conclude this paper without saying a word or two on the preparation of wool for sale. It is unfortunately the case that in this country much good wool is partly spoilt and much moderate wool is made poorer than it need be by bad preparation for market. A special point is the use of tar and pitch as marking fluids or for treating wounds. The manufacturer finds it impossible adequately to express his feelings about tar and pitch. They are quite ruinous. Tiny particles which cannot possibly be seen by the sorter spread out in the cloth to the size of a shilling, leaving a stain that cannot be properly removed by any treatment. So much Welsh wool is made up into fabrics that will not be dyed that the use of pitch as a marking fluid is especially objectionable in this case. Manufacturers sometimes say that there is no wool that they would sooner use for making blankets, that no wool gives them such a good finished product, but that again and again they have tried it and had to abandon it because of these stains. I will not refer to this in detail because I wrote a short article for a recent number of the "Farm and the Market," dealing with this question. There are alternatives.

Once again, the great essential for wool improvement is that the breeder should be interested and really look at his fleeces. Wool production is as mysterious as meat production, but not more so.

THE IMPROVEMENT OF SHEEP PASTURES, WITH SPECIAL REFERENCE TO HILL GRAZING.

Professor R. G. Stapledon, M.A., Welsh Plant Breeding Station, Aberystwyth.

The Age of Science has definitely dawned and whether farmers, with the rest of mankind, like it or not it is beyond their power to stay the progress of science—it is beyond their power not to move with science—they must swim with the tide or drown. And what is all this science? It is two things, it is a love of truth, a striving

after a knowledge of the real inwardness of things, and it is an urge to understand and manipulate Nature. It is this latter, the POWER aspect of science, that now for better or for worse definitely dominates the world and leaves nothing untouched. Power science, as Bertrand Russell tells us, is "an attitude of mind and a technique." Science accepts nothing except what is based on experiment, it draws conclusions and makes guesses only on the basis of experiments. Tradition, no matter how valuable as a corrective in other respects, is only of interest to science in so far as what may be traditionally held may have been based on experiment. It follows that about 70 per cent. of the traditional beliefs of the farmer are of precisely no scientific validity and as far as progress in the modern—and alas, not very tender or emotional—sense of the word is concerned, constitute a dreadful millstone around the neck of the Agricultural Industry.

Nearly twenty years ago, for some reason best known to himself, Mr. Bryner Jones fetched me into Wales and turned me loose on your hills—a sort of shepherd without any sheep, a scientist faced with colossal problems, all the problems of grassland indeed, with no facilities for conducting experiments and with no staff—not even a dog! I was, however, unscientific enough to start guessing without experiments, though not without very considerable observations of the relation of vegetation to the habits of sheep, and I guessed that the Welsh hill sheep walks were capable of improvement, tremendous improvement, and on an economic basis, but then I had no very definite idea of how it was to be done. Fortunately, Mr. Bryner Jones also guessed that grassland must matter to Wales, and later, owing tremendously to Mr. Bryner Jones as well as to the munificence of Sir Laurence Phillipps, Wales came to possess a Plant Breeding Station, and owing to the Empire Marketing Board and a variety of fortunate accidents that Station became also a Grassland Research Station. So now we were all going to experiment, and indeed gentlemen, we have experimented to some tune in the last 12 years, and we can now guess with the dice comfortably weighted in our favour. Other things happened, the Station made an amazingly profitable friendship with Mr. Stanley M. Bligh, of Cilmery Park, a man who nobody would accuse of being unduly influenced by traditional beliefs in matters agricultural; made also highly profitable friendships with a number of eminently practical and successful hill farmers; with men like Mr. T. Jones of Moelglomen, Mr. J. L. Bebb of Goginan, Mr. Hugh Jones of Pensarn, a man who never ought to have been allowed to leave Wales, and Mr. J. Davies of Lletyevanhen, and now, as the future is going to show, has made a uniquely profitable friendship with another man not unduly tied to the heels of tradition—I refer to my friend Captain Bennett-Evans. That is not all—behold, the tractor, and behold in particular that species of tractor, the Caterpillar.

In one respect your Welsh hill pastures are in a very strong position—there is only one practical tradition grown up with them. I have little doubt, indeed I am sure, for every lover of nature must feel the emotional attraction of the Welsh hills, that all manner of im-

mensely valuable emotional traditions have sprung from these hills and waste grazing lands. I am here concerned with power science and practical matters, and the practical tradition is that these hills constitute natural pastures and therefore the question of the possibility of improving them on a grand scale, of totally altering them indeed, has, I suppose quite naturally, never entered into anybody's head. They will carry a certain number of sheep and that is all about them. There is, fortunately, no erroneous tradition as to methods of improvement to be broken down, no long-continued malpractices to warp our judgement. The hill grazings are just unexploited raw material and we can start from scratch—scientific scratch at that, and as a matter of fact, as I shall show you, the first thing to do is to scratch them.

The tractor is similarly in a strong position. We have not got to live down the errors and the practical prejudices of our fathers in the matter of the tractor. Our fathers knew not the tractor. It is far easier to live down one's own prejudices than to live down those based on the authority of our fathers, our grandfathers, and our great-grandfathers. No doubt it takes a bold heart to tackle the open hill country—but I know the Welsh hill farmer pretty well, and I believe if we can show him how to do it and help to organise the whole thing for him, he will do it. Bad times are perhaps good for us all—you can either go morbid in bad times and give up the ghost, or think hard as to how to make the very best of better times when they come. Well I will now dispense a whole lot of food for thought to the hill man, and tell him what I would propose and how I would propose to do it. I shall not convince the hill man at the first blush, any more than I shall convince my professional and collateral colleagues, for those mixed up with the land, be they professors, county organisers, farmers, teamsmen, or shepherds, are not easy to move where revolutionary ideas are concerned—but I am going to get you all thinking now and during the next some months, and acting during the next few years, or die in the effort.

What are the essential features of our sheep walks? Taking Wales as a whole, and particularly Central and West Wales, a very large proportion of them occur on more or less undulating country, and by virtue of valleys cutting in in all directions in the aggregate the amount of shelter is very considerable. They are, on the whole, remarkably well served by roads and tracks good enough for modern motor traction. Over very large areas the soil depth is surprisingly good, while a vast area is covered with what I may describe as tractable peat. Taking the Welsh hills as a whole, I am inclined to think they afford a greater area under gramineous herbage than is the case in Scotland, for example, but naturally heather, cotton grass and the like, cover considerable areas in the aggregate. Heather areas can of course be greatly improved for sheep and should always be burned on a regular rotation, but I shall confine my suggestions to the more essentially grass areas—large enough in all conscience.

Broadly speaking your grass associations are of three main types :—

(1). The *Molinia,* or Flying Bent swards. These are terribly

abundant in Wales, a very large proportion of them occur on tractable peat and on land that is not steep, on areas indeed over which a Caterpillar tractor could easily operate. The *Molinia* pastures on lower ground merge into bog areas too treacherous even for a Caterpillar tractor, areas which for the time being I am quite happy to leave untouched.

(2). The *Nardus*, or Mat Grass pastures. These usually occur on steeper ground than the flying bent pastures—mat grass is the most worthless grass in Britain. I should say as a guess about half the area under mat grass would carry a Caterpillar tractor with perfect safety.

(3). The fine Bent-Fescue pastures, of the heaths and mountains. These occur on the steepest hillsides, but also on undulating ground. They are associated with gorse and with too much bracken. At a conservative estimate the Caterpillar tractor could operate over at least one-third of these finer pastures.

All these pastures to a greater or lesser extent suffer from the following very serious defects :—

(1). They consist of species with inherently short-growing seasons. This is especially true of flying bent, which, from the sheep point of view, only gives useful herbage for about three weeks in the whole year.

(2). The flying-bent and mat grass herbage is dreadfully unpalatable for the greater part of the year, and is therefore allowed quickly to grow into an un-nutritious stage and to become well-nigh useless. These swards, as my friend Professor Fagan has shown, are very deficient in minerals.

(3). All the swards of the hills are extremely lacking in legumes, legumes being entirely absent from the flying bent and *Nardus* pastures, entirely lacking, except for occasional traces of bird's foot trefoil, over a large proportion of the *Agrostis*-fescue pastures, and only represented by white clover, and then usually sparsely, over a relatively small area. It follows because the clovers are richer in minerals, and especially in calcium, than the grasses, that all the hill herbage offering to sheep, here, there and everywhere, is deficient and probably seriously deficient in minerals, and especially in lime.

(4). The sward, such as it is, occurs on a mat of greater or less thickness—it is the first axiom of grassland management that you cannot maintain a good sward on a mat. Now you can scale up your grasses something like this :—

Flying bent and *Nardus* are the least valuable and dominate the poorest situations.

Comes next in the scale of usefulness and demand on fertility, sheep's fescue and sweet vernal grass.

Comes next bent and red fescue.

Comes next Yorkshire fog.

Comes next Cocksfoot.

Comes last—the most nutritious and thus making the highest demand on fertility—perennial rye-grass.

Perennial rye-grass, cocksfoot and Yorkshire fog to any sort of perfection will not grow on a mat—the other grasses will.

The only two legumes you have got to consider for the hills are wild white clover, or wild red clover and bird's foot trefoil, and with help they will grow on a mat and by growing on a mat they will gradually defeat the mat, and white clover *can* grow almost anywhere on the Welsh hills, up to 1,400 feet anyway—if you will help it.

Now improvement of pastures all the world over turns on two things, and in the last resort on two only—

(1) Introducing and maintaining clovers where before there were none.

(2) Substituting for the grasses present, others which are better —never mind how little better.

So if you encourage sheep's fescue to spread in a *Nardus* or *Molinia* pasture you have improved that pasture. If you can introduce Yorkshire fog and sweet vernal grass you have improved it still more—if you can introduce white clover you have altered its whole character.

Similarly if you can maintain cocksfoot and white clover on an *Agrostis*-fescue area you have entirely revolutionized that area. The whole thing is to kick your type of vegetation in the direction of a type one better than itself. Just contemplate this thought. If all the *Molinia*-flying bent pastures of Wales were sheep's fescue, Yorkshire fog pastures I would dare bet that you would have gone a long way to double the sheep-carrying capacity of over one-third of the sheep walks in Wales. Contemplate this further fact, if on certain selected areas on a walk you can introduce and maintain red fescue, Yorkshire fog and cocksfoot, you would enormously add to the November-April keep of these hills.

I would then say to you breeders and animal geneticists—dare I say it—KEEP AN EYE ON THE FUTURE—climate is, and always must be, a serious limiting factor to the winter carrying-capacity of your Welsh hills, but vegetation is not going to be the serious limiting factor it has been—we botanists and plant geneticists then challenge you breeders and you animal geneticists to breed a truly hardy hill sheep to do the greatest possible justice to the vegetation that we are going to produce for you.

This address of mine is rather like a detective story, the clues are only going to work out in the last page of the last chapter. So now I had better tell you how the murder of your *Molinia-Nardus* and legume-deficient heath pastures is to happen. The villain of the piece is the Caterpillar tractor which makes all things possible; the accomplices are phosphatic and nitrogenous manures, cunningly supported by cheap seeds. The brains behind the whole plot being those of white clover.

Well if you happen to be lion-hearted, like my accomplice, Captain Bennett-Evans, you go on to a densely matted *Molinia* pasture with the tractor and a big disc plough and turn the whole thing up—peat and some sub-soil, chunks of quartz and perhaps the bones of prehistoric man, let the winter work its way, and above a thousand feet the winter will have a good bit to say. Harrow it down in the spring, and a Caterpillar and only a Caterpillar could do that, but can do it easily. Then you are ready for the next processes.

If you are more subtle, and like to watch the slow intervention of natural forces, and more gradual changes in vegetation afford you interest and pleasure, you do not break up the whole thing. Perhaps you are ingenious, like my arch-accomplice Mr. Bligh, and you invent your own implements. He drags about the trunks of trees lengthwise 2 or 3 at a time bound round corkscrew-wise with wire rigging rope—where the mat is not too dense this brings soil to the surface and bashes about the herbage—that is his first process. If you are bound to tradition—as I am necessarily bound to tradition, surrounded as I am by agriculturally-trained colleagues of one sort and another—you drag about such agricultural implements as you have got. We have used the ordinary Martin Cultivator, a special Disc Harrow and some specially strongly tined harrows I got from New Zealand.

Your first process, however you do it, is to break into the surface of the mat, to aerate and to bully and wound the existing herbage. The indications are that this pre-treatment should always be done late in the summer or in the autumn, so as to let the action of the winter, which you get free, gratis and for nothing, be your second treatment. Your third treatment is to sow manures. Now please note I am manuring not to create tremendous soil fertility, but simply to help seeds to establish themselves—especially to help clovers to establish themselves; what I am aiming to do then is to manure the top surface, the actual surface and the top half inch of soil. For my fourth, and what I may call my epoch-making treatment, is the sowing of seeds.

As to manures you simply must apply phosphates, you will not get any clover take unless you do this—no matter if you scratch till you have buried yourself and your tractor—and for the young seedlings you want the phosphates to be readily available. If you use mineral phosphates you should apply the autumn before sowing. If you use high grade basic slag it will do to apply at the time of sowing. Now the whole question boils down to this, in order to make clovers establish themselves where there has never been clover before, in terms of basic slag, what is the minimum dressing to apply? We are conducting an enormous number of experiments on this point— 5 cwt. is ample, and likely enough 2 cwt. is often ample—but in the case of all dressings of slag less than nearly a ton your chances of success are enormously increased if you will use nitrogen. Let me only say that we have been getting quite astoundingly good results with 2 cwt. of basic slag together with 1 cwt. of nitro-chalk—with indications that on some types of hill grazing even these quantities may be reduced. Here is the essential point. Use manures alone and you will get some results, but they will not be material or sensational. One of the first experiments which led me on the path which I have now embarked was an experiment where we applied phosphates and nitro-chalk to a *Molinia* pasture, in less than a year bent and sheep's fescue had done much to oust the *Molinia*, and the little plot was vastly improved, but of course still without white clover.

Cultivate or scratch alone and you will get either no benefit or only slight benefit. Scratch and manure and you will increase your benefit to a real and appreciable extent. Scratch (or plough if your

heart is big enough), manure and sow and you get the brains of white clover, and the brains of the plant breeder to help you—and you get sensational, epoch-making and indeed perfectly astounding results.

From the point of view of establishing seed, remember you have always got the mists and dews of the hills to help you, and with the manurial help you have given—far from the sowing of seeds being a form of madness, it is the pivot on which the whole rejuvenation of the Welsh hills depends.

Let me put this question to you. If the Forestry Commission can establish spruce and other trees on your sheep walks, why cannot we people, who know about grasses and clovers, with your help, establish a different type of grass and clover to what exists already on these walks ?

Now what to sow and where to get your seeds. You are going to sow chiefly white clover, Yorkshire fog, bent, sweet vernal grass, and as we get the seed of the right type bred for you, you are going to sow cocksfoot—cocksfoot offers tremendous promise for your *Ffridd* land, and for the heath-pasture banks—and come by and by you will sow one of Mr. Jenkin's super rye-grasses on selected places. For the moment you have to rely chiefly on white clover, Yorkshire fog, sweet vernal grass and bent, and what little cocksfoot the Plant Breeding Station has at present available, and that will take you a long way.

In short you are going to buy seedsmen's cleanings, and you will buy them by the cwt.—you want to sow about 1 cwt. to the acre—you can support these by seeds from your own loft sweepings, which will give you plenty of Yorkshire fog and sweet vernal grass, or you can let some of your lowland meadows go to seed—later on of course you will be growing your own special seed—my cocksfoot, a pedigree Yorkshire fog etc., on your own lowland fens—for you have got to sow heavily and you have got to have cheap seed.

Yes, cleanings and loft sweepings ! But what about the docks, the buttercups, the yellow rattle and the rest of it ? Well, what of them ? Will they grow in the hills—I very much doubt it, and if they do, they will be no more worthless than mat grass and flying bent, so not much matter. Besides you can easily buy cleanings free of these things—and especially of genuine wild white clover, ordinarily speaking the weed seeds in which do not matter a bit. Last year in connection with Mr. Bligh's and our own experiments I bought over 3 tons of cleanings at prices varying from 6/6d. to 17/6d. per cwt., excel ent viable stuff and as far as I can see I have distributed no noxious weeds about the place. We are talking about open hill country at 800 to 1,600 feet above sea level, and in regard to weeds, just as in regard to valuable grasses and clovers, everything is relative.

I am not trying to make Leicestershire fatting pastures or well fenced arable fields on the flanks of Plynlymon—we must keep our sense of proportion and of relative values.

Well there is the whole plot and the murder revealed. There are heaps of details to be considered—clues to be followed up. A certain type of treatment will be found best and most economic for each type of grazing to be improved. I have dealt, and advisedly dealt, to-day

with general principles—and the general principle above all others I would wish to stress is that emphatically, and in very truth, the Welsh hill sheep walks are suitable subjects for scientific, practical, economic, improvement. The thing can be done, and done comparatively easily. Just this last word. I am not advocating the wholesale and indiscriminate tackling of all the sheep country of Wales. I am advocating that improvement be undertaken on carefully selected parts of every sheep run—let every sheep run have its areas of mineral efficient and long growing-season herbage. The thing has to be done step by step —the highest step is the first step. The methods I have outlined are applicable to thousands upon thousands of acres of lowland country too. What we badly want is for the type of people who do haulage contracting to possess themselves of Caterpillar tractors and to contract for this sort of work. If times go so bad that Government has no money left for Agricultural Research, such is the faith that is within me, or the madness that possesses me—faith or madness which has possessed me just because our experiments, in my opinion, have been successful and extremely informative despite the fact that they were carried out on some of the worst type of grazing imaginable—that this pasture improvement contracting business is *The Business* in which I shall set myself up.

WELSH MOUNTAIN SHEEP AND THE LIVE STOCK IMPROVEMENT SCHEME.

Mr. R. N. Jones, Superintending Live Stock Officer for Wales.

I have been asked to make a brief statement for the information of this Conference on the Ministry's Scheme for the improvement of Welsh Mountain Sheep. Through the medium of the Scheme it has been pretty clearly demonstrated that it is possible to secure improvement in Hill Sheep by co-operative effort.

The Ministry of Agriculture's Scheme for Live Stock Improvement came into operation in Wales and Monmouth in the early spring of 1914, and grants were awarded to Societies for the provision of Stallions, Bulls, Boars, and to encourage Milk Recording.

When the Live Stock Officer was explaining the Scheme to farmers in the hill districts of North Wales, he was often asked the question—Is there any provision for sheep improvement ? And he was compelled to reply in the negative. The Sheep Farmers were very insistent in their demands and after giving the matter careful consideration (with the assistance of Professor White of Bangor) an experiment was started in Trawsfynydd in 1917.

Certain conditions were laid down and the small Society formed, readily complied with these.

The Society was to consist of ten members and they were allowed to send six ewes each to the ram. A deputation from the Society went to the College farm to select the sire, and it may be of interest to note

that their choice fell on the Royal Prize winner Snowdon F8. It was arranged that the ram should arrive at Trawsfynydd on a Fair Day—so that all could see him, and within an hour or two of his arrival, 20 members were enrolled, with the result that they were only able to send three ewes apiece to the ram. This shows that farmers know a good ram when they see one, and were tumbling over one another to become members, with a view to participating in the experiment. The progeny of this particular ram were outstanding, and many prejudices and barriers to sheep improvement were broken down straight away.

It is interesting to note that this Society has continued operations for 15 years.

In the following year (1918) the adjoining district of Llanfachreth pressed for the same privilege ; it was granted—and with encouraging results.

It now having been demonstrated that it was possible to organise and run successfully sheep improvement societies, the Council of Agriculture for Wales and the Welsh Mountain Sheep Society definitely recommended to the Ministry the advisability of allocating grants for the purpose of Welsh Sheep Improvement, and by the autumn of 1919—three grants of the value of £10 each were allowed and allocated to North Wales. By 1921, 13 grants became available, and this year 29 grants were utilised.

The object of these Societies is to encourage improvement of the breed of *Welsh Mountain* Sheep by the provision of a high class ram or rams.

All rams hired under the Scheme are approved by the Live Stock Officer and hired on such terms as may be authorised by the Society.

The *ewes* intended for service by the ram are approved by a Selection Committee and the Live Stock Officer as being suitable animals of the Welsh Mountain breed of sheep.

The Society provides (a) for a suitable enclosed field or ffrith in which the ewes and rams are to be confined during the service season ; (b) for a suitable shepherd to take charge of the ewes and ram, and to mark the ram every alternate day. All ewes and their progeny, up to last year, were marked with distinguishing Tattoo Marks.

The service season, unless specially sanctioned, must be not less than 2 months.

The rate of grant is 3/4d. per ewe, so if 60 ewes are served the Society earns a grant of £10.

The service fee of a ram must be not less than 1/- per ewe.

Levies on each number are made to cover the cost incurred during the season.

The enthusiasm with which hill farmers have taken up the Scheme would appear to prove conclusively that they fully appreciate the assistance and guidance given by the Ministry.

The effect of the Scheme may be summarised as follows :—

(a) Increased interest in the selection of rams for the hill. This is borne out by the demand for the best rams at Annual Sales.

(b) Progeny Shows have been started, and County and other Shows are extending their Schedule of Prizes to cover Hill Sheep.

(c) In several districts it is noted that there is better all round management than formerly.

(d) The Scheme has been the means of increasing the interest in, and the membership of the Welsh Mountain Sheep Flock Book Society. The last volume of the Flock Book issued in 1931 indicates that the Society consisted of 206 members representing 11 counties, with an entry of *378* Rams and over 1,700 Ewes from 120 flocks. This is a clear increase since the inception of the Scheme of 153 members, 290 Rams and nearly 1,300 Ewes.

To meet the demand for Rams an annual sale was established at Aberystwyth in 1922 and this has met with conspicuous success.

No other movement, of late years, has been so instrumental in focusing attention on selective breeding and management of Hill stocks.

Owing to the financial stringency, there are no prospects of any extension of this Scheme.

THE DISEASES OF SHEEP.

Dr. R. F. MONTGOMERIE, B.Sc., Ph.D., F.R.C.V.S.,
School of Agriculture, University College,
Bangor.

I think in opening any address on "The Diseases of Sheep" one should direct attention to the very remarkable increase in our knowledge of these diseases which has taken place during the post-war period. Research into animal disease has always suffered lamentable lack of support; a very surprising position in "The Stud Farm of the World." The few workers engaged in Veterinary Research in this country before the war, partly by reason of the sources from which they received their meagre support and, perhaps, partly because of the location of their laboratories, inclined to direct their attention more particularly to diseases of horses and of cattle. The post-war period has seen this position somewhat alleviated in that the number of veterinary research workers in the country has been greatly increased and research directed into a wider field. Diseases of sheep have certainly received their share of attention from post-war workers in Veterinary Research and as a result several serious diseases have been brought under control. In fact this paper is based very largely on work of recent date. Yet, if I were here to appeal for the extension of research, I could with considerable ease occupy the whole of the time at my disposal by naming and describing disease conditions of sheep alone which are as yet improperly understood and more or less uncontrolled.

So far as the Principality is concerned the position of research into animal disease has been quite in line with that of the country as the whole. Wales benefited by the work of such pioneers as Sir John McFadyean and Sir Stewart Stockman in the pre-war days, just as it has benefited by the establishment of the institutes which have more recently come into being. There is a development within its border which, I think, is a considerable advance. Two centres for research into diseases of local importance have been established in Wales. Mr. Bissett is located at Cardiff as Veterinary Adviser for the Southern part of Wales and it is my privilege to serve the six Northern counties in a similar capacity. The main work of these two veterinary advisers is the study of diseases of local importance. They deal only with diseases which occur as outbreaks, with the prevention of disease and with diseases of obscure origin. How far their work meets the need of the Principality I must leave to you gentlemen to judge. Certainly there is evidence that it has materially benefited agriculturists in the areas and I do hope that with the co-operation of the local veterinary practitioners and of you gentlemen, there may continue to be recorded some progress in reducing loss from animal disease in Wales.

You will appreciate that in my seven years work in Wales my activities have been confined to the six northern counties. If what I say is not applicable to the southern counties I can only ask you to please appreciate that my knowledge of conditions in the South is limited. The subject of sheep diseases is such a wide one that I must decide to deal with only some of the conditions of particular importance in Wales. I will group these diseases under three headings :—

1. Some diseases characterised by more or less sudden death.
2. Some diseases of pregnancy and lambing and of the young lamb.
3. Some parasitic diseases.

1. Some Diseases Characterised by more or less Sudden Death.

Diseases which may be grouped under this heading, largely because the ailing sheep is seldom seen alive, are particularly difficult to study. You all realise that the first thing a dead sheep does is putrefy. Even before death, in some cases, germs from the stomach and intestine invade the body. With death this invasion is very marked in sheep. For this reason in examinations not conducted just after death one may obtain a whole host of germs and find it impossible to determine which was responsible for death and which are simple putrefactive invaders. The difficulty may be likened to a search for a sharp pointed needle in a stack of more or less blunt needles. The history of the investigations into Braxy exemplifies this. From time immemorial Braxy has been a serious disease of young sheep in Scotland. Many investigations were made and many opinions expressed. It was only following Gaiger's determination to found his work on the examination of quite fresh material, obtained at considerable difficulty, that real progress was made and a solution of the problem obtained. Herein lies one of the great reasons why many of us believe that the study of some sheep diseases can only be effectively conducted by a research officer actually on the spot.

Braxy.

Since the term Braxy has its origin in Scotland I think it well to apply the name only to that disease of sheep in their first season, occurring in the earlier part of the winter and often with the first frosts of the year, which cause the sudden death of the best of the flock. In Wales this condition is quite commonly called " Clwy Coch " but, since in some parts it is termed " Clwy Ddu " or even " Gwaew," I rather hesitate to use one Welsh name as the synonym for Braxy. The work which we have done on this condition in North Wales satisfies us that it is identical to the Braxy of Scotland—caused by the germ *Vibrion septique*. It is true that there is a predisposing factor and it would seem that the eating of frosted grass by the best lambs predisposes them to attack by this bacillus which gains entrance to the body at some point in the wall of the fourth stomach or of the first part of the small intestine. At one or other, or both, of these sites in the recently dead animal one may observe a patch of very marked inflammation. Largely through the work of Gaiger and of Dalling the nature of Braxy is known and the disease may now be regarded as one of the preventable diseases of sheep. Vaccines prepared from *Vibrion septique* have given excellent results in Scotland and in the North of England. In Bissett's hands in South Wales and in North Wales similarly good results, using the double dose vaccine, have been obtained. We have on trial now a single dose vaccine, which has been favourably reported on by Stewart in Northumberland. If our results with the single dose vaccine approach those obtained with the double dose vaccine, farmers whose flocks suffer from Braxy will have at their command a very efficient, convenient and thoroughly safe means of preventing these losses.

Ewe deaths in Spring.

In many districts in North Wales deaths occur among ewes in Spring which, while very variable in incidence, reduce by even 10 per cent. the ewe stock on some farms. In certain years some farms and certain districts suffer particularly, in others these farms and districts have only light losses. Not uncommonly a batch of deaths occur within a few days and there is no further loss that Spring. The first deaths often occur some time in February. Throughout March and April loss is encountered.

Usually the ewe is simply found dead but occasional sheep are seen ailing for an hour or two before death. One of the best ewes may be dead within an hour or two of its being observed grazing normally.

There is some reason for suggesting that these deaths are more or less coincident with periods of growth of young spring grass. A change to wild weather conditions may be immediately followed by a crop of cases. In a cold slow Spring fewer losses occur.

On post-mortem examination inflammation of the small intestine is the prominent abnormality. Although circumstances would suggest that some organism similar to that which causes Braxy is at work in these cases, our evidence is against this view. In at least some cases

the disease is of rather a different nature. While we are not prepared to dogmatise, our work suggests that the absorption of a poisonous substance from the bowel is the cause. This substance may be the product of some germ normally present in the intestine which suddenly finds conditions suitable from growth and toxin production. It may be of quite a different type. There is great difficulty in obtaining quite fresh material for investigations for many farmers are inclined to regard these losses as inevitable. With the co-operation of local veterinary surgeons and farmers this difficulty should be overcome.

Until the nature of this disease is better understood one cannot, of course, make good suggestions as to prevention. I know of one instance where the farmer appeared to avoid loss by turning his ewes from low ground to upland pasture each evening, but apart from that I have not encountered a practice which appears to be of value. We have, however, carried out some experimental inoculations and, although confined to a small number of ewes, they hold out some prospect of a solution to this problem.

" Pulpy Kidney Disease " in Lambs.

While the name " Pulpy Kidney Disease " of lambs may be new to the great majority of the conference the disease I am about to describe is very well known. A very forward young lamb, 3 to 6 weeks old, is found dead ; the best lamb of the flock is found lying on its side with its head pulled back on to the shoulder, its legs firmly extended and perhaps showing convulsive fits. That is what has been termed " wool-ball in lambs," largely because on post-mortem examination one or more wool-balls may be found in the fourth stomach. We have, however, evidence that in the stomach of about 75 per cent. of lambs of that age there is at least one wool-ball. Only very rarely is a wool-ball found in such a position that it might have caused death. I am suggesting that wool-balls have nothing to do with these deaths and that because the kidney on post-mortem examination is found congested or pulpy an appropriate term, until the disease is better understood, is " Pulpy Kidney Disease."

Lambs which die of this disease are regularly in very good condition and between 3 to 6 weeks old. Deaths often occur in batches and are almost confined to the last week of March and the first two weeks of April. On post-mortem examination the liver is regularly found very congested, the heart-sac often full of fluid, the external and internal surfaces of the heart showing haemorrhages and the small intestine much congested. Most typical of all, however, is the condition of the kidney. Its outer part is very markedly congested—full of blood—and, if the lamb has been dead some time, is broken down to a pulpy mass. Thus when the covering of the kidney is cut the content drops out as a mushy mess.

These post-mortem appearances do not suggest obstruction or other action by a wool-ball. They do suggest a toxaemia—the circulation in the blood of some poisonous product. Our observations point to the illness and death of these lambs as caused by the absorption of a

poisonous substance from the small intestine. The bowel contents, diluted with an equal volume of salt solution and filtered quite free of every germ, will very often quickly kill a laboratory rabbit when injected into a vein in quite small amounts. Our investigations in this connection are in line with those of New Zealand workers on what appears to be an identical disease which they have named " Pulpy Kidney Disease."

We do not know the nature of the poisonous substance. It may be that conditions are present in the intestine which encourage the very rapid multiplication of some germ, or germs, which produce much toxin. It may be that in the high state of metabolism so characteristic of affected lambs the normal mode of breaking down certain food-stuffs becomes so deranged that a poisonous substance is produced.

While it would seem that we may be on the high road to a proper understanding of this condition, much further work remains to be done. It is interesting to observe in passing, however, that the use of Lamb Dysentery Serum on farms affected with that disease appears to prevent " Pulpy Kidney Disease " and it may be that by the injection of serum we can prevent these losses.

" Struck " and " Black Disease."

There are two other conditions included in this group which, although not present in Wales so far as I know, are worthy of mention.

A disease named " *Struck* " is responsible for considerable loss among sheep on the Romney Marsh of Kent. McEwen and Roberts have shown that this disease is due to a specific germ which they name *B. paludis*. In very recently dead cases an inflammation of the small intestine and of the fourth stomach, occasionally accompanied by ulceration of the intestine, is the most prominent lesion. Excess of fluid in the abdominal cavity is general and similar excess may be found in the thoracic cavity and in the heart-sac. In cases which have been dead some time a post-mortem change occurs in muscle which is so like that seen in a case of " black-quarter " of cattle that it was previously thought " struck " in sheep and " black-quarter " of cattle were the same disease. McEwen and Roberts have shown that death is due to the toxin of this *B. paludis*, developed in the intestine. Prior to death few of the germs actually invade the body. Their experiments on the prevention of this disease are not yet complete but it is reasonable to persume that an efficient vaccine will be available very soon. There are certain points of similarity between the ewe deaths mentioned as occurring in Wales and this " Struck " of the Romney Marsh.

" *Black Disease* " is the cause of very serious sheep losses in many districts in Australia. The recent work of Turner has shown that the deaths are caused by a germ named *B. oedematiens* which multiplies in an already damaged portion of the liver and produces a deadly toxin. While the resting stage of that germ is present in the liver of many Australian sheep it does not multiply there until some part of the liver is damaged by another factor. The common factor responsible for this

damage is the young wandering stage of the liver fluke. You are aware that the young fluke reaches the liver from the abdominal cavity and, penetrating the covering of the liver, wanders for a little time among the liver cells before it enters the bile-ducts. This wandering damages the liver sufficiently to allow the germ to become active. It is believed that the control of fluke disease will greatly reduce loss from Black Disease and Turner has shown that a vaccine prepared from the germ will reduce the mortalities by even 98 per cent. The Commonwealth of Australia is said to have lost £100,000 per annum through Black Disease. There is every reason to expect that figure to be greatly reduced in the immediate future. We know that fluke infestation is not an uncommon occurrence among our sheep and if Black Disease were present in Wales we would find many losses occurring during the months when fluke infestation is taking place, in August and September. So far as I know that is not the case but one must bear in mind this work which points so definitely to the possibility of fluke, or other worm infestation, preparing the way for the invasion of very deadly bacteria.

2. Some Diseases of Pregnancy and Lambing and of the young Lamb.

In-Lamb Ewe Disease.

There has come into prominence in recent years a disease which may affect ewes during the three weeks before lambing. The affected ewe may be seen by herself and on approach may show some nervous symptom but very soon this excitement gives way to a dullness which is a pronounced and continuing symptom. The appetite is entirely lost and the ewe often presents a dismal picture as she stands with her head down and her ears drooping. She moves sluggishly and lies for very long periods. Generally the illness terminates in death but if the ewe lamb or abort quite rapid recovery is usual. Affected ewes are regularly carrying two or more lambs and the striking post-mortem feature is the very fatty state of the liver, which is yellowish-white in colour. Our observations in North Wales suggest that the sheep most liable to attack are those which were in good condition in Autumn and which during the late winter months before lambing are losing condition. It is as if the ewe with the greatest reserve of fat so freely drew upon it when receiving insufficient nourishment that metabolism became upset. It is, in any case, unwise to have ewes in particularly good condition at tupping time if that condition cannot be maintained until the coming of spring grass.

The nature of this disease is not known nor has any treatment adopted so far been of avail. There is a very simple preventive measure which in our hands has met with considerable success. In many affected flocks we have recommended gentle exercise and with the adoption of this suggestion deaths have ceased. We have suggested that the ewes be taken out on to a road, walked quietly half a mile out and then brought back to their grazings. In some cases this has been done twice a day but it would seem that this gentle but forced exercise once daily is sufficient. I prefer walking the sheep on a road

because if they are simply taken round the field the same even degree of gentle exercise cannot be obtained.

Lambing Sickness.

A condition which closely resembles that of milk fever in the cow occurs among ewes but, so far as I am aware, it is not common in Wales. It occurs usually during the first week or two after lambing, occasionally later and a few cases probably do occur in in-lamb ewes. The ewe appears unsteady in her gait and soon falls to the ground and lies there in a semi-conscious condition, often with her head drawn back and occasionally kicking violently. This disease is rapidly fatal if treatment is withheld. It appears to be identical in almost every respect with milk fever of cows and Howie, when Veterinary Adviser to the North of England province, had inflation of the udder adopted by farmers and shepherds in that district with marked success. Although the blood in these cases is markedly deficient in calcium, there is no evidence that this deficiency is related to a lack of lime in the pastures and at the present time there is no good suggestion for the prevention of the disease. In these circumstances it is fortunate that udder inflation is so satisfactory a mode of treatment.

Abortion.

Abortion is not a common disease of sheep in Wales, but investigations by Bosworth and Glover at Cambridge, have so advanced our knowledge of this problem that I must mention their work in passing. They have shown that there are two types of contagious abortion among sheep in this country. The most common is very infectious and may cause quite an abortion storm in the flock but, fortunately, infection in one season produces a degree of immunity which protects the sheep against further abortions. These affected sheep are, however, liable to transmit the infection to susceptible animals which are drafted into the flock. Similarly, ewes purchased from flocks infected with this type of abortion, may easily carry it to their new quarters without themselves aborting. It would seem that infected animals are carriers capable of transmitting infection to clean animals in a relatively short period when grazing with them. Bosworth and Glover have not been able to satisfy themselves as to the actual location of the germ in the body of these carrier ewes but whatever that site be, it would seem that it is one from which it can easily spread to healthy sheep. The second type of contagious abortion, due to an entirely different organism, is less common than the first. I would mention in passing that the bacillus which causes contagious abortion in cattle has never been known to cause naturally occurring outbreaks of abortion in sheep.

Lamb Dysentery.

In relatively recent years a disease of young lambs named Lamb Dysentery came into prominence. While it has probably existed in certain localities for many years, it so spread in the counties of the

Scottish-English border that it became a very serious menace to the sheep-breeding industry of these districts. Wales was thought to be free from this disease until, in 1926, it was diagnosed in one locality in my province. Since then centres of infection have been found in several counties in England and at other sites in North Wales. This disease is spreading in the northern section of Wales and I am glad of this opportunity to make the disease better known to the flockmasters of the Principality.

Lamb Dysentery in its acute form is mainly confined to lambs one to seven days old, but lambs even three weeks old are not uncommonly affected, usually with a more chronic form. In acute cases the lamb may be found dead or very seriously ill without having shown any symptoms previously. More usually the affected lamb lies for long, it is dull and listless, makes only a poor attempt to follow the ewe and sucks little. Evidence of abdominal pain is seen and often the lamb stretches itself in a curious fashion and emits a plaintive bleat. Some degree of diarrhoea, often stained with blood, is seen in most of these cases. The lamb rapidly becomes very weak, has a very drawn expression and dies in a comatose state. Very few of these cases recover. In chronic cases among older lambs similar symptoms are seen, blood-tinged diarrhoea is more evident and a larger proportion of recoveries usual.

In the first year of infection in any flock only a few deaths, generally of the very acute type, occur, usually among the last batch of lambs. In the second year, the disease makes its appearance earlier and with greater severity. In the third and subsequent years, deaths may occur among even the first lambs and, with a greater proportion of the very typical subacute cases, the death rate not uncommonly rises to over 30 per cent. of the lambs born. At about this figure, it may remain or it may abate to some extent in later years.

On post-mortem examination acute cases may show only an intense inflammation of the intestine. This inflammation may be ascribed to another cause and lamb dysentry remain unsuspected. In less acute cases the typical lesion, ulceration of the intestine, is obvious. These ulcers, varying in size from a pin's head to a sixpenny piece, may readily be seen, surrounded by a red ring, without even opening the bowel. On opening the intestine they are often found in great number, with a yellowish centre and an angry inflammatory border. Not uncommonly, ulceration has eaten right through the bowel wall and adjacent portions of intestine adhere together.

Through the work of several investigators, particularly of Dalling, of the Wellcome Research Laboratories, it is now almost generally accepted that this disease is caused by a germ very like that named *B.welchii*. It is certain that this " lamb dysentery bacillus " is the cause of the deaths. This germ, multiplying many thousand fold in the intestine of affected lambs, is the producer of a very powerful toxin. Probably by the aid of its toxin it is able to invade the bowel wall and cause the necrotic ulcers so characteristic of the disease.

The dysenteric droppings of affected lambs contain many millions of these germs which have such powers of resistance that the pastures

may remain infective for a long time. Although lambs may die of lamb dysentery when even only 48 hours old, there is good evidence that they are not born affected. Very soon after birth these germs may gain access to the intestine by way of the mouth. The first gasps of the newly born lamb lying on an infected patch of ground may suck them in. The first attempt to suck may bring these germs to the mouth from a contaminated udder or from contaminated wool. So the germ may reach the bowels to establish itself, multiply, produce its toxin and kill before the lamb is many hours old. Certainly a contaminated field is the scource of infection; whether infection takes place in the first hours or in the first days of life is a matter of chance. The greater the number of lambs which become infected, the more the contamination of the pasture, the greater the chance of infection, and, within certain limits, the more virulent the germ. This is obvious from the history of any lamb dysentery farm, the contaminated land carrying infection over from one lambing season to the next.

It is often impossible to determine the manner in which lamb dysentery has spread to clean farms or how it has been introduced into a clean district. It is often just as difficult to determine why it has not spread to a farm in the centre of an affected district. There is no evidence that infection may be introduced by newly purchased rams. It would seem that ewes drafted out in Autumn are not liable to carry lamb dysentery to clean land. This is fortunate because, were it otherwise, certain areas might find their trade in draft-ewes in danger.

On the other hand, sheep taken from dysentery farms while lambing is in progress may readily convey infection to clean land. It is also very probable that sheep may carry infection during a short period after lambing has ceased. There is certainly much danger of the trade in couples being a means of disseminating the disease. Couples from a lamb dysentery farm should not be taken to clean land. Recently an instance in which ewe lambs sent out to winter brought back this disease to the farm has come to my notice. The lambs were grazed in a lamb dysentery area and were returned to their owner after lambing had commenced there. A few proved in-lamb. Just one or two of their lambs became affected but they created a centre of infection and the disease spread to the the main flock.

Quite probably the spread of this disease is aided by vermin. It is not uncommon to find the carcase of one of these young lambs devoid of intestines. They have been picked out through the soft navel by a wily crow. I have seen a crow fly into the air from a dysentery pasture trailing behind it a considerable length of intestine. It is easy to imagine the contents of that intestine drop on more than one field and the site at which the crow devoured its booty become a real danger spot. The farmer whose flock is affected has a responsibility towards his neighbours. For his own sake as well, he should take precaution against gross contamination of his pasture and mechanical spread of the disease. This he can do by immediately burning or burying every carcase and by removing each case when observed to some place in which its germ-laden droppings can cause no harm.

All this seems so obviously sensible and practical that I need not dwell further upon it.

The search for products which may be used in the prevention of lamb dysentery has met with marked success. There are two types of preventive inoculation each of which has given very satisfactory results. One is a serum for inoculation into the new-born lamb; the other a vaccine to stimulate in the ewe the production of protective substances which she will pass on to her lamb.

(1). **The serum inoculation of lambs.**

A serum valuable in preventing infection with Lamb Dysentery bacillus is now available. Since infection may occur during the first hours of life, the inoculation with this serum must not be delayed or otherwise infection may have already taken place. The recommendation, therefore, is the inoculation of every lamb born on infected farms within 12 hours of birth. At first sight this may seem almost impossible, but it has been, and is being, carried out without unreasonable inconvenience on many farms in this country. Serum inoculations carried out as I have stated, can often completely eliminate loss from Lamb Dysentery. In one field experiment, which we carried out in North Wales on 10 infected farms, every other lamb born was inoculated within 12 hours of birth, the alternative lambs being left uninoculated as controls. Among the 323 lambs inoculated no deaths occurred, of the 313 lambs not inoculated, 65 died of Lamb Dysentery—20.67 per cent. In another district, 66 of 103 lambs born on two affected farms were inoculated, 37 being left untreated as controls. One of the inoculated lambs died, a lamb which had been missed and was not inoculated until more than 12 hours old. 10 of the 37 control lambs died of Lamb Dysentery. Many similar figures can be quoted. It is sufficient to say that by the use of Lamb Dysentery Serum this disease can be brought as effectively under control as one would wish.

(2). **Vaccination.**

It has long been known that in some cases one may protect the progeny by vaccinating the mother. I do not wish you to think that this means that the progeny is born protected. As a matter of fact the young have no protection at the actual time of birth. The highly immunised mother passes a very large quantity of protective bodies into her colostrum or first milk. In this way, with the first suck, the young obtain these protective bodies which, absorbed into the system, enable it to resist the particular disease against which the mother has been immunised. This knowledge was applied by Dalling in the case of Lamb Dysentery, and he has shown that by vaccinating the ewe, the lamb may be protected. The ewe must be vaccinated on two occasions. The first inoculation must be made at least some 3 or 4 months before lambing is due to commence, and is best done before tupping time. The second inoculation is performed within one month of lambing. Probably the nearer to two

weeks from actual lambing, the better the result. This means of prevention has also been widely tested and it has succeeded in Wales, similarly as it has in the north of England and the south of Scotland. In my opinion it hardly gives the same degree of protection as does serum inoculation of the lambs and I, personally, prefer the lamb inoculation method from many points of view. Where circumstances of management make lamb inoculation impracticable, vaccination of the ewe can be recommended. I would point out that where a ewe has received two inoculations in one season, in subsequent seasons it is only necessary to inoculate once, at within one month of the date of lambing.

There is a third method of prevention which merits at least a passing mention. It has been shown that the inoculation of ewes near lambing with serum prepared in sheep is also a satisfactory procedure, but the method has, I think, only a limited use. It could be employed in a non-vaccinated flock in which Lamb Dysentery had made its appearance and where lamb inoculation was not practicable.

I cannot see that the presence of Lamb Dysentery affects the export trade of the Principality to any great extent. Within our borders it is a problem which merits the very serious attention of flock masters. *It is preventable.*

(3). Some Parasitic Diseases of Sheep.

Liver Rot.

During recent years the subject of liver fluke disease in sheep has been so frequently ventilated that I almost hesitate to mention it here for I am afraid that in my hands it is almost threadbare. Yet, it has so menaced sheep husbandry in Wales in the past, that my address would be incomplete if I did not deal with it briefly.

I assume that all are familiar with the symptoms of liver rot and know the worm parasite—the common liver fluke—which, living in the bile ducts of the liver, gives rise to this disease. I must also take it that the life-history of this worm—complicated affair as it is—is sufficiently well known. I will content myself by emphasising three points all important to a proper understanding of the rationale of the control measures which may be recommended.

1. The liver fluke does not multiply within the sheep.
2. An intermediate host—the small fresh water snail, *Limnaea truncatula*—is essential to the multiplication and propagation of the fluke. No matter how many infested sheep are grazing a field, provided that field is free from snails there will be no increase in number and no spread of the parasite.
3. The more free from flukes animals grazing snail infested fields are, the less will be the multiplication and spread of the parasite.

Our efforts to control this disease must therefore be directed along two main lines :—

1. The destruction of the snail.
2. The freeing of animals from flukes to reduce the number of fluke eggs passed out into the pastures.

Work directed towards these two ends has met with success. The copper sulphate dressings recommended by Walton are eminently suitable for the destruction of the intermediate host snail. Carbon Tetrachloride dosage, within certain limits, is a satisfactory means of freeing sheep from flukes. You probably know that it is being applied for this purpose on a world-wide scale. Despite the fact that most sheep will tolerate large doses of this drug, some flocks, particularly if trough fed, are intolerant and have shown serious symptoms after even the usual 1 cc. dose. It may also be that weather conditions influence in some way the ability of sheep to withstand the effects of dosage. Work in America has shown that the tolerance of dogs to this drug is closely associated with the amount of lime in their food. Dogs fed a diet rich in calcium may be dosed with a large quantity of carbon tetrachloride without ill effects, whereas those on a diet deficient in calcium are easily poisoned. There is no evidence that a similar relationship exists in ruminants, and it is unfortunate that carbon tetrachloride poisoning in sheep and cattle is not, so far as I am aware, receiving due attention. So valuable is the drug in the treatment of parasitic diseases of sheep, that a study of its toxicity might well be regarded as one of the most urgently required investigations. Until this matter is cleared up it would seem advisable to dose a few representative members, particularly if they are receiving any hand feed, two days before proceeding to dose the whole flock. The great majority of sheep owners appear to consider this precaution unnecessary.

The dosage of the whole flock as a precautionary measure, in contrast to the treatment of the few clinically affected sheep, has become general practice, but it is impossible to lay down hard and fast rules as to the frequency with which this should be practised. The number of the occasions on which a flock should be dosed in any winter must vary with the nature of the previous summer and autumn, and with the history of the individual farm so far as fluke infestation is concerned.

Stomach Worms.

While worms parasitic in the fourth stomach of sheep may cause much damage in sheep on arable land I must confine my attention to the conditions they cause in pasture sheep. It is impossible to even estimate the damage these worms do since in many cases they are responsible for the poor " doing " of lambs without ever coming under suspicion. In other instances, they cause many deaths and many severely stunted lambs and, while their effects are more plainly seen in young sheep, ewes cannot be regarded as free from this trouble. In fact the ewe is the common reservoir from which eggs are passed onto the pasture to develop and lead to severe lamb infestation.

The symptoms of stomach worm infestation may be little more than a general unthriftiness. In the severe cases which commonly occur in late summer and autumn, diarrhoea, great loss of condition and weakness, together with a bloodlessness which may simulate that seen in fluke disease, are prominent features.

There are two stomach worms which either jointly or separately can give rise to this disease. The more common—the "twisted wireworm" (*Haemonchus contortus*)—is about an inch long and thinner than an ordinary pin. Its dark brown-red colour makes it fairly easy to see on the inner surface of the fourth stomach of affected sheep. The other, like a very fine thread about half-an-inch in length, is difficult to find unless some of the contents or a scraping from the stomach wall is teased out in water over a black background.

The eggs passed out in the droppings of the sheep hatch on the pasture and the tiny larval worm moults twice to become an ensheathed very resistant form which infects sheep when ingested with grass. This form may remain alive on the pasture for even twelve months. When it is picked up by a sheep it becomes adult in the stomach in about 3 weeks.

Since the symptoms are indefinite and since it is important to determine which worm is present it is always advisable to seek professional assistance when faced with what may be an outbreak of stomach worm disease.

A variety of treatments have been recommended for this condition, but the simple copper sulphate treatment is generally as satisfactory as others. I quote from the Ministry of Agriculture's excellent leaflet (No. 75) dealing with this question:—

"A solution of pure copper sulphate (bluestone) is made up by dissolving 4 ozs. of the pure crystals (which should be of a clear blue colour with no white parts) in 2½ gallons of water in a porcelain or enamel container. This will be sufficient for 100 sheep, and doses should be given as follows:—

Sheep weighing 80 lb. or over	4	fluid ounces.
Lambs weighing 70 lb.	3½	,, ,,
Lambs weighing 60 lb.	3	,, ,,

The preparation of the solution may be hastened by dissolving the bluestones in a little hot water and bringing the quantity up to 2½ gallons afterwards. The best way to administer the dose is by means of a metal funnel leading through an adjoining portion of rubber tube to a short metal tube; the sheep is held in a standing position with the metal tube in its mouth by one man, while another holds the funnel and slowly pours in the measured dose. Some little danger attaches to this proceeding if carelessly done, through overdosing or the passing of the solution into the lung, and it is more satisfactory to have proper veterinary supervision at hand.

A fast of 12 hours before dosing, and of five hours afterwards, renders the treatment much more effective, but this measure is not altogether necessary, and, if the sheep are already in a weak condition, may not be desirable."

This mode of treatment, while efficient against the common stomach worm has, like all other drugs tested, little influence on the smaller stomach worm.

With regard to the control of this disease it must be emphasised that these worms do not multiply within the sheep. The multiplication and spread of stomach worms is entirely dependent upon egg

production by the adult female and egg distribution by the infected sheep. Since there is no known dressing which will destroy eggs and larvae in pastures, one must attempt to limit the amount and density of pasture contamination. This can be done by avoiding overcrowding especially on bare pasture and by regular dosage of the flock. In flocks where this trouble is even only occasionally met, regular dosage should be practised. It must be appreciated that the ewe, although showing no symptoms, is infested to some extent. Ewes and lambs alike should be dosed at regular intervals of about four weeks throughout the summer and early autumn. The interval is selected by reason of the fact that eggs commence to appear in the droppings of sheep about three weeks after the larvae have been picked up. By this repeated dosage each successive batch of worms is destroyed before egg laying has commenced in earnest. The nearer this system is approached the less will be the contamination of the pastures.

I have had to choose just a few diseases from quite a long list and to proportion my time between those selected as seemed most fitting. I can only hope that I have chosen in the interests of this Conference. If I have not, you will please appreciate that I could only "sense" what your wishes would be. There are no statistics of the incidence of animal disease available as a guide. I will close by saying that two disease conditions appear to have had a serious influence on the draft ewe trade of the Principality. The one is liver fluke disease. Many men have been afraid to purchase Welsh ewes because they knew others who had lost the greater proportion of their purchases from liver rot. I do hope that that is almost a thing of the past. The position with regard to the other disease is much less satisfactory. I refer to Sheep Scab. This is a scheduled disease and as such does not come within my province as a Veterinary Adviser, but I may be permitted to class myself as a very interesting and fairly well informed observer. Sheep scab has been eradicated from other countries by methods very similar to those adopted here. Admitted, there are difficulties more or less peculiar to Wales. Doubtless there were difficulties peculiar to these other countries. The biggest difficulty of all is a certain want of co-operation and of determination. If I may presume to speak to the farmers of Wales on this matter, I would say, "The methods applied in this country for the eradication of sheep scab are thoroughly sound. If they fail, they fail from imperfect application. Determination and co-operation will perfect application. The double dipping of every sheep of the flock is a means of eradicating scab not of merely satisfying an order of the Ministry of Agriculture."

THE MARKETING OF SHEEP IN WALES.

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The present time is opportune for some consideration of the sheep industry in Wales, especially from the viewpoint of the processes of marketing. For most of the last ten years sheep husbandry has been generally a profitable enterprise for Welsh farmers. Prices of sheep have declined less rapidly than prices of most other farm commodities, and up to the previous season the trend of the trade had remained in favour of sellers. During this post war period, far reaching changes have taken place both in the demand for mutton and lamb for consumption in this country and in the nature of the supply of home killed and imported carcases to meet that demand. Countries exporting mutton and lamb to the consuming markets in England and Wales have been improving the quality of meat supplied, and in most cases they have managed to build a structure of effective organisation for marketing their produce. The net effect of improvements in production, handling and marketing of overseas supplies of meat has been to make competition keener in the home markets, and the producers of mutton and lamb in this country have been obliged to cater carefully for consumer demand in order to maintain a price margin indicating the preference of consumers for home killed meat.

Changes in the nature of consumer demand and the needs of the consuming markets have been impressed upon sheep farmers through the medium of price, and adjustments in production have been made on all sides. The effect of these modifications of practice can be seen in

(1) Decrease in numbers of wethers and especially those over two years.
(2) Increase in fat lamb production with heavier supplies in early summer months than formerly.
(3) Increase of autumn and winter fattening of store lambs in pastoral areas.
(4) Tendency towards smaller breeds of ewes especially the spread of the Improved Welsh Sheep and their crosses in the lowlands.
(5) Greater variety of breed crosses, particularly with Welsh sheep, in the lowlands for fat lamb production.

These changes have been gradual but persistent, and generally speaking, they are still proceeding. They occurred at a period when numbers of sheep on farms were increasing and when the sheep industry was becoming more important relative to other farm enterprises in Wales. Farmers have been concerned to fit the organisation of the sheep enterprise on their farms to the needs of the ultimate market for their produce, and this has been effected in many areas with conspicuous success. But changes of this nature implemented by farmers acting individually have complicated the marketing processes. New demands have been made of the individuals performing marketing services, and it behoves farmers themselves to examine the services rendered to producers by marketing agents ; to enquire how effectively

the system is working to assemble, select, and distribute produce to the consuming centres with the least possible waste and the most complete understanding of needs and requirements.

The present situation.

The sheep industry in Wales is a complex of different enterprises. The type of sheep kept and the nature of the trade varies according to district and according to type of farm and farming system. The nature of business differs fundamentally on highland and lowland holdings. The main products of the former are store lambs, wethers and draft ewes; while rearing policy on the latter holdings is arranged mainly for fat lamb production with some fattening of ewes and young mutton especially in the winter months. There is considerable transfer of ewes, store lambs and wethers from the highland to the lowland holdings within the Principality, and a general movement of breeding stock and store animals for fattening from the Western counties and highland districts to the better quality low lying lands of the East and into the fattening areas in England.

The intricacies and the difficulties of the marketing system are increased by the variations in type of product, whether fat lamb or sheep or store animals which come off farms, due to the variety of crosses used for breeding purposes.

It is not unusual to find variations in type of sheep kept on farms in the same district where the same market is supplied and a similar demand catered for. This feature is more marked in some counties than others, and generally speaking it occurs mainly in the lowlands. The analysis of breeds in three counties in 1927 was as follows :—

NUMBERS OF EWES OF DIFFERENT BREEDS IN THREE COUNTIES.

	Anglesey	Flint	Pembroke
Welsh	55,362	22,519	1,000
Kerry	3,239	1,263	1,630
Lleyn	1,815	176	—
Wiltshire	1,224	—	—
Southdown	965	288	192
Shropshire	709	136	5,150
Suffolk	531	359	1,543
Cheviot	221	464	109
Scotch	221	1,394	—
Radnor	87	—	—
Dorset Horn	26	—	—
Welsh x Wilts. ..	9,932	—	—
Crossbread	7,033	20,319	20,905
Local	555	—	—
Border Leicester ..	—	591	15
Ryeland	—	16	773
Oxford	—	3	2
Hampshire	—	—	713

The figures cover a fair sample of the flocks in the three counties, and other data available indicate that the position is similar in other counties. Generally speaking, the native breed predominates and there is less variety of breeding ewes in Anglesey, Caernarvon, Merioneth, and North Cardigan, while the native Kerry and Radnor breeds make for uniformity of type in Radnor and Breconshire. The extreme variety of crossbreds is found mainly in South Wales, and Montgomery and Denbigh in North Wales. The net effect of a variety of policies with regard to breeds, especially when the final destinations of the product of these areas are similar, is to increase the work of selection for marketing purposes. It means that the task of assembling supplies for specific markets is more complicated and the work of distribution of supplies from any area with varying types, weights, and qualities becomes onerous and expensive.

In so far as mutton and lamb, the principal final products of the sheep industry in Wales, are considered the trade can be divided into several sections. In the first place there is the home market or the local demand. In all the rural districts local supplies of mutton and lamb are consumed. The holiday resorts of the North, West, and South-West coasts provide a heavy seasonal demand for lamb and excellent markets for the local product. The extent and the importance of the local market can be indicated by statistics of actual slaughter for local consumption in some counties.

SHEEP AND LAMBS SLAUGHTERED FOR LOCAL CONSUMPTION 1927.

	Anglesey.	Caernarvon.	Cardigan.
January	667	7,583	2,170
February	601	6,870	2,186
March	755	6,454	2,289
April	1,482	9,088	2,722
May	1,890	9,465	2,566
June	2,872	13,907	2,951
July	3,895	20,067	4,029
August	4,590	21,864	5,471
September	2,913	16,520	3,667
October	1,482	9,660	2,461
November	881	8,358	2,371
December	650	8,098	2,015
Total	22,678	137,934	34,898

The total slaughter for local consumption in Anglesey amounted to about 20 per cent. of the total output of sheep, the remainder being exported to other consuming areas either in North Wales or

Lancashire. In Caernarvonshire the consumption of mutton and lamb is actually considerably greater in each year than the output from the county of fat sheep and lambs. There is certainly some export from this county, but it consists mainly of store sheep and ewes. For consumption, supplies of meat have to be imported and these come mainly from the neighbouring counties of Anglesey and Flint. Cardigan gives another example of an area with a small local demand, compared with available supplies from the county, and there is considerable export of fat as well as store sheep. From these figures of slaughter, it is estimated that less than a third of the total output of sheep and lambs are consumed locally in this county, the remaining two thirds are exported either as stores for fattening in other districts or as fat sheep or lambs to distant consuming markets.

Although no actual figures are available showing local slaughter in other counties in Wales, the position can be roughly estimated as follows. In Denbigh and Flint, both counties prominent for fat lamb production and winter feeding for mutton, there is considerable local consumption. In the case of Denbighshire, this has been estimated at 160,000 sheep and lambs annually. But in addition there is an export from the county of about 140,000 sheep and lambs. These totals include sheep imported into the county for fattening, as well as those reared within the County. Montgomeryshire is an area with relatively small local consumption, and the greater part of the output of mutton and lamb is exported. Merionethshire is mainly concerned with the export of breeding ewes and stores and it has been estimated that not more than about 20 per cent. of the output is for direct consumption as mutton or lamb. This figure, representing only about 30,000 animals, is only barely sufficient for local consumption, but production is highly seasonal and surplus fat lambs are exported in August and September, and there is considerable import of mutton and lamb at other seasons. Brecon and Radnor are both areas of low local consumption and there is considerable export of both fat lambs and sheep from the lowlands, and stores and breeding ewes from the highlands. The nature of the trade in Pembroke is similar to Cardigan, with relatively small local consumption and an important export surplus mainly of fat sheep and lambs. Carmarthenshire has an appreciable local demand, but there is a distinct movement of supplies from the rural areas of the west to the consuming centres in the east of the County and in west Glamorgan. In Glamorgan and Monmouth, both important sheep counties, local consumption exceeds local supplies at all seasons and has to be supplemented by home killed mutton and lamb from neighbouring counties and by considerable supplies of meat from overseas.

The surplus of fat sheep and lambs from Welsh farms are marketed in three principal consuming centres. For North Wales surplus areas, Manchester and Salford are the main consuming markets. The following table illustrates the importance of Lancashire as a consumer of Welsh mutton and lamb.

PRINCIPAL DISTANT MARKETS FOR SHEEP AND LAMBS OF FOUR COUNTIES.

	Anglesey	Caernarvon	Denbigh	Flint
Manchester and Salford	63,463	16,639	52,697	11,468
Liverpool and District	—	—	27,121	4,785
Lancashire towns	—	—	4,225	2,518
North Wales Coast ..	14,438	1,364*	23,218	2,288

*By rail transport. Road transport supplies very heavy (see table above).

About 60 per cent. of the total output and about 80 per cent. of the total export surplus of Anglesey is consigned to Manchester and Salford. For Cardigan, Montgomery and to some extent Brecon and Radnor, the Midlands provide the chief outlet for surplus sheep and lambs. The distribution of export for Cardigan in 1927 was :—

Birmingham	13,252
Manchester	7,238
Rhondda	2,636
Cardiff	2,622
Swansea	1,888

Export of fat sheep and lambs from the South of the County is mainly into the consuming centres of South Wales and forms part of the general movement of supplies into the South Wales market from West Wales, including Carmarthen and Pembroke. In recent years there has been a growing tendency for some of the better quality fat stock which would normally have been consigned for slaughter in South Wales from the South-West Counties to be marketed in Birmingham or the Midlands and to some extent in London. This is a direct result of the poor industrial conditions in South Wales and the consequent decline of purchasing power.

Methods of marketing sheep in Wales vary from district to district and according to the nature of the trade. In a review of the sheep trade in the Principality it is imperative to deal with the different sections of the trade separately. An attempt will be made in the following notes to outline the main features of each type of trade as it exists at present.

The trade in draft ewes.

In general this trade in Wales consists in the transference of some of the final products of sheep farms in the highlands to replenish or replace breeding flocks in the lowlands. The trade follows the contour lines fairly closely, and supplies are distributed from hill and mountain districts to the valleys and middle land areas within Wales and to some districts in England. There is a fairly definite movement south and east, but in parts of North Wales, westward to Anglesey. In the nature of the trade, it is impracticable to estimate the turnover of these surpluses, but the numbers assembled at seasonal auctions

and fairs at convenient points in August and September, give an indication of its scope. The seasonality of the trade and its importance in some of the more hilly counties is illustrated by the following records of movement of sheep in each month in 1927, which show clear differences between a lowland county (Anglesey) and two others.

PERCENTAGE MONTHLY EXPORT OF SHEEP AND LAMBS.*
1927.

	Anglesey	Cardigan	Merioneth
January	1.1	6.6	2.5
February	0.5	2.6	1.1
March	0.6	2.3	1.3
April	3.4	3.0	3.3
May	15.9	8.1	7.1
June	17.3	10.3	5.2
July	16.1	7.9	3.4
August	20.9	12.0	18.3
September	10.6	24.8	29.9
October	7.9	10.8	18.7
November	4.3	6.2	6.2
December	1.4	5.4	3.0
	100.0	100.0	100.0

*These figures show exports by rail only. There is in addition, considerable transfer by road of ewes and pasture lambs in August and September, in some counties. For example, large numbers of draft ewes are driven across the mountain from the Tregaron district in Cardiganshire to Brecon and Builth in those months.

The trade in draft ewes from highland districts is limited to a definite season of the year from August to early October. A great proportion of the trade is carried on directly between farmers. Lowland farmers frequently purchase supplies from the same hill farm year after year, and this method has the advantage that buyers have a thorough knowledge of the quality of sheep they are buying. This practice has become more prevalent in some districts of late years, as healthiness in sheep has become so potent a factor in values. This direct transference, however, can only be carried on to a limited extent, and the supplies of the great hill districts of Brecon, Radnor, Merioneth, Caernarvon and North Cardigan have to be assembled and distributed through regular marketing channels. The regular livestock dealers in the counties or special dealers for this trade in some cases handle a proportion of the trade, selecting supplies directly from farms and selling to farmer customers in their own districts, or for export to other dealers, or to large farmer customers in distant lowland districts in Wales or in England.

Most of the old fairs are now operated as auction sales, although some private treaty selling still occurs. There has been a growing tendency of recent years to centralise these sales and many of the smaller fairs and auction sales have disappeared or have become unimportant. There is room for still further centralisation of these special sales. The trade is intricate and it is important that the best stocks should be mobilised in large numbers at convenient export points in order to attract buyers from distant areas.

Some weakness of these sales of recent years has arisen because the best stocks are sold privately from farms to farmer purchasers and dealers, leaving only the culls and poor quality ewes to be assembled at the auction sale with the result that the best class of dealers and farmers are not attracted, and the sale in general will give no satisfaction to the farmer suppliers or to the buyers. Some of the better known ewe sales are held at Knighton, Sennybridge, Brecon, Welshpool, Rhayader, Llanidloes, Llanybyther, Devils Bridge, Talybont, Kerry, Bala.

The trade in store sheep and lambs.

In outline these trades are similar to the trade in ewes. Surpluses of store sheep (including wethers) and store lambs come mainly from the highland holdings and they are purchased for fattening in the lowland districts in Wales or for export to English areas. The main part of the trade is handled in August and September, and under modern conditions it consists mainly of store lambs up to six months old brought from hill and middle land farms. The trade in wethers has diminished of recent years and is not likely to present any important marketing problems in the near future. Store sheep including the culls and barren ewes from lowland farms are marketed mainly in the spring and autumn months. Numbers are generally small and sale is mostly direct between farmers, from farmer to dealer, or through the ordinary local livestock markets.

Methods of sale of store lambs, are generally similar to those described for breeding ewes, large numbers being transferred by dealers direct to farmer buyers, and through the early autumn auction sales and fairs. These store supplies consist mainly of Welsh Mountain lambs from the hill farms, but a considerable proportion are crossbred lambs from poor land farms at intermediate elevations. The mixture of breeds and types found at any sale centre is sufficient indication of the great difficulty of the marketing problem with these store animals over the whole country.

The trade in fat sheep.

Dealing with the marketing processes it is not possible to dissociate entirely the trade in fat sheep from the trade in fat lambs. Lambs for slaughter are sold from some hill farms, but very little mutton except of wethers in some cases, is produced on these holdings.

In outline, the trade in fat sheep consists of supplies of mature wethers, cull, barren and aged ewes, and young mutton from store

lambs winter fattened for the market in February and March. There is little regular fattening of tegs and hogs during early summer in Wales, and most of the meat that can be clearly defined as mutton consists of the surpluses of the breeding flocks in the lowland areas. But the trade in summer fat lambs is so definitely seasonal in most areas that the mature lamb or young mutton marketed in the early months of the year is better classified for present purposes with the trade in fat sheep.

Speaking generally, the mutton supplies from Welsh farms are marketed from November to May and the greater proportion of the whole trade consists of winter fattened lamb or young mutton. The scope of the export of mutton from some lowland counties illustrates the position.

EXPORTS OF SHEEP FROM SOME LOWLAND AREAS.

	Anglesey	Denbigh.	Cardigan.
November	3,776	11,361	5,035
December	1,205	7,262	4,349
January	976	7,403	5,299
February	480	4,528	2,095
March	565	4,154	1,848
April	2,955	5,023	2,420
	9,957	39,731	21,046

The percentage of total annual exports of sheep and lambs recorded for these months were :—

Anglesey	11.3 per cent.
Denbigh	27.9 ,, ,,
Cardigan	26.1 ,, ,,

The trade in mature mutton from Welsh farms is largely of the nature of transference of supplies between different districts of the Principality. There is a certain amount of export from North Wales to Manchester, but supplies from Denbigh and Anglesey are distributed over the Coast towns. Supplies from Montgomery reach the Border towns and the Midlands, but on the other hand towns like Aberystwyth draw supplies from Newtown and Welshpool. During the months October to May, what supplies remain after satisfying local needs in Cardigan, Carmarthen and Pembroke, are marketed in South Wales.

The trade in fat lambs.

Sheep flocks on lowland farms are maintained for the principal object of fat lamb production. The hillside farms sell as many as possible of the lambs in fat condition. The hill farmers who have some good low or middle land, together with the unique advantages held by the Welsh Mountain breed for this trade, are frequently able to sell excellent fat lambs during July and August. From the nature of the case the trade is highly seasonal, more so in the highlands than

in the lowlands. But the trend in all counties shows a gradually increasing supply from April or May to August and September. The quantities produced in some lowland counties for 1927 indicate the position.

OUTPUT OF SHEEP AND LAMBS, MAY—SEPTEMBER.

	Anglesey	Denbigh*	Cardigan
May	15,858	12,249	9,077
June	18,095	15,878	3,325
July	18,089	16,674	10,419
August	22,970	20,666	15,152
September	12,261	20,466	23,466

*Exports only. The figures of production for Cardigan in August and September contain a proportion of store lambs and Sheep.

Methods of marketing in general, are similar for fat lambs as have been described previously for other classes of sheep. Local retail butchers try wherever possible to select their supplies on farms. The surpluses of the export areas are mainly selected by local dealers, assembled, and consigned direct to wholesale meat traders in the consuming centres of Manchester, Birmingham and South Wales. In some cases the duties of the local dealer are undertaken on a commission basis, and in others the sale is direct from dealer to retail butcher, the dealer working to order. Occasionally supplies of lambs from Anglesey are drafted to the livestock markets at Manchester or other Lancashire centres. Only small proportions of total output of fat lambs are marketed through the local livestock markets, but these vary in different counties.

Sale in most districts is on a " per head " basis, but in the South West, sale by liveweight is fairly general.

Examination of the problem of marketing of fat lambs in Wales raises the following points :—

(1) Is the quality of lamb produced on farms that most desired by consumers in distant markets and for which they are prepared to pay the best prices ?

(2) Is the present arrangement of the trade the best possible for the interpretation of consumer demand to producers.

(3) Is the personnel in the trade, working individually and without co-ordination of activity, able to handle a highly seasonal trade in the best interests of the producers ?

(4) Is there a possibility of extension of the trade in fat lambs, which with improvement in quality will enable Welsh lamb to become a recognised high grade product in the English consuming markets.

An American authority has written* " While finished lambs are bred and fed towards the ideal established by the consumer, yet the

* " Progressive Sheep Raising." Wentworth & Ellinger.

finished animal is always a compromise between what the consumer wants and what the producer can most economically furnish . . . In general the sheep feeder looks for points that indicate a profitable utilisation of feed. He wants a rugged framed lamb, strong and broad in the back and limbs, deep in the chest and of an active rustling disposition. Practically none of these points are of importance to consumers." Recent investigations have been conducted into the nature of consumer demand in this country and conclusions are that "In the last 30 years or so the demand for a small joint has been in evidence in the case of mutton and lamb, as for all other kinds of meat . . . In general the demand in England and Wales is for a small joint weighing from 3½ to 5 or 6 lbs."†. This general tendency for consumers to demand small compact joints is appreciated by butchers and dealers, and to some extent by the majority of farmers.

In Manchester for example, the demand favours lean carcases and for this purpose the Anglesey Welsh-Wiltshire cross is admirable. On the other hand the North Wales coast towns prefer well-finished compact carcases and the Welsh-Southdown cross is preferred. For local purposes there is no definite organised demand for a single type of product and the prevalent carcase is that which producers in the vicinity see fit to supply. But however much the variety of demand that could be enumerated, there is a general preference for well finished 30-36 lb. lamb carcases, and in general, however much of this quality that may be supplied there will always be an abundance for other sections of the trade of heavier carcases with poorer finish not suitable for the highest quality market.

It is safe to say that in Wales at the present time, there is room for a considerable increase of supplies of fat lambs of the requisite quality. The limiting factors are the lack of uniformity of breed and type in all lowland areas, a variety of finish and condition and definite tendency for weights which do not sell in the best market. There is fairly general agreement that the quality of milk-fed lambs supplied from April to June are esteemed by the trade. But selection of the best quality lambs is continuous by butchers and dealers throughout this period so that there remain the animals of inferior quality to be moved in August and September. By this time the farms with only medium or poor land want to clear the lamb crops, and these enter the fat or the store market. In each year there is a feeling of glut in the fat lamb market and the general average of quality is poor. Prices react to supplies and inferior quality, and there is some transference between the fat and store lamb markets.

Conclusions and Recommendations.

The Trade in Ewes.

This aspect of the sheep trade in Wales has reached an important stage in its history. In general, sheep farmers in the lowlands are tending to look more and more to the highland districts for fresh

† Report on Marketing Sheep, Mutton and Lamb, p. 35-37. Economic Series No. 29.

supplies of breeding ewes to replenish and replace stocks. This trade is already carried on to an appreciable extent directly between farmer buyers and sellers. Knowledge of breed, type and to some extent of the "history" of the ewes are important in this trade, and the most satisfactory basis where that is possible is by direct sale. A considerable proportion, however, of draft ewes have to be mobilised at centres for marketing. The movement for auction selling at these centres is proceeding and the need is for still more centralisation for sale purposes. Large well organised auction sales, owing to the selection that can be offered to customers, attract buyers. Competition is likely to be keen, and there is ample opportunity for grading and selecting of uniform lots.

The same remarks apply in general to the trade in store sheep and lambs. The personnel of the marketing system perform the difficult task of assembling supplies, sorting, selecting, and finally distributing them, often in quite small lots to farmer customers. But the costs of such a system are necessarily heavy and in those areas where dealers are heavily engaged in this trade, the organised sales are hampered with regard to supplies, and what is more potent the general level of quality is low. The remedy in this connection is obvious, and lies in the power of farmers themselves to implement. Large scale, well organised auction sales at convenient centres would provide farmers with opportunities for selection, and at the same time attract buyers from distant areas to clear the surplus over and above local demand. There appears to be little possibility with the present variety of supplies, and of needs, of instituting any satisfactory system of grading either with store lambs or ewes.

The Trade in Fat Sheep and Lambs.

The trade in mature fat sheep (as distinct from lambs and young mutton) in Wales consists in clearing surpluses from the breeding areas, and these are mainly for local slaughter. They include in many cases aged ewes, and in others ewes which are over-fat and which it would be practically impossible to sell for consumption at the export centres.

Considerable supplies of young mutton are produced from the winter fed lambs. A great proportion of the trade is in the hands of butchers for local slaughter, and the surpluses are moved largely by dealers, direct from farms or through auction markets to consuming areas. There has been a fairly general feeling among butchers handling these carcases in recent years, that they are not sufficiently well finished for high quality trade. There is reason to believe that more farmers have purchased store lambs for fattening in recent years, and the venture has been profitable due to the relative scarcity of mutton supplies in early spring. But many have undertaken to fatten the stock without the requisite crops and feeding stuffs and perhaps without a thorough appreciation of the points of high quality and good finish in young mutton.

Coming to the fat lamb trade, the most important and the most clearly defined of the sections in the sheep trade in Wales, there

appears to be greater scope for improvement in the marketing services and to some extent a greater need of reform than with the other branches of the industry here described. The fat lambs sold off farms are the principal final products of the industry. The trade is highly seasonal, and both the local and the export markets are important. There are clearly defined export areas either supplying consuming centres outside or inside the Principality. The local trade is largely handled by the retail butchers by direct purchase from farms. But most of the long distance trade is moved by dealers in the trade.

The greatest problem of the fat lamb producers in Wales at present, is the improvement in the quality of the lambs produced. In some areas this means smaller weights and greater uniformity in supplies. In other areas it suggests better general breed and type and more uniform finish. There is less criticism to make of lambs of the Welsh breed than of lambs produced from the crossbred flocks of the lowlands. In many lowland areas a move should be made for a smaller type of sheep preferably of the Improved Welsh type.

The trend at present is in the direction of a smaller type of lamb and this should be encouraged. This trend of consumers' preference should be part of the technical knowledge of every sheep farmer. Farmers in Wales are in the main, aware of the tendency. Much is done by educational services both in the Counties and at the Colleges to bring to the notice of farmers the general need for better breeding and good husbandry. But it is the task of the marketing system and the personnel engaged in it to impress on farmers the main feature of consumers' preferences. Methods of marketing fat lambs at present, lack any attempt at co-ordination of purpose. Dealers act individually and sale is usually made privately between dealer and farmer.

Without a form of organisation which will pay the farmer for his produce, according to grade and quality, and which will show him clearly the effect of consumers' preference on the price of produce, there can be no great improvement in results.

In general, it is suggested that any great improvement in areas of fat lamb production in Wales will not be implemented by educational methods or by the complicated detailed methods of operation of the present dealer system. Dealers in areas where payment is made on the basis of liveweight tend to buy at a flat rate per pound on all farms, regardless of weights and general quality, with the result that there is little or no incentive given to producers to adapt their policy to accord with market preferences as illustrated by prices realised. The purpose of organisation and the marketing machinery thereby set up will be apparent to a lesser degree in saving for producers the costs incurred by the dealer system, although those may be considerable in some areas, than in being able to induce farmers to improve production and by grading to place a high quality standardised article on the market.

The details of a desirable organisation for fat lambs will have to be worked out with reference to export areas and consuming markets. But generally speaking, the organisation suggested in the form of Producers' Selling Agencies commends itself for this purpose. These

agencies would export produce and sell on carcase weight at the chief wholesale meat markets. If these schemes could be worked with a recognised system of grading and standardisation at the wholesale meat centres through the National Mark, it would be a great step forward in the process of establishing Welsh lamb as a first grade product for the consumers of this country.

A FURTHER NOTE ON THE WELSH SHEEP TRADE.

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Professor Ashby in his analysis has raised many problems of fundamental importance to sheep farmers.

In regard to the sheep industry, as in other cases, both costs and incomes must be considered. The costs, or expenses, in this industry have not increased in proportion to costs on the other farm enterprises and the net income may still be found to be in favour of the sheep enterprise when we compare costs and returns with those of other departments of the farm. The purchasing power of sheep prices have not to my knowledge been worked out, and it would be of interest from a business point of view, if prices and costs could be related and the purchasing power of sheep prices compared with the purchasing power of prices in respect of other farm products. In the matter of lamb production, the question of yield is one of great importance and some complexity. The Welsh ewe is generally popular and a low lamb yield is characteristic of the breed, yet the lamb produced is eminently suitable for the present-day demand of the consumer and there may be a sound reason for sacrificing yield to quality in this way. There is therefore, a possibility that an attempt to increase the yield may, in some instances, result in a lower quality product and the policy may fail to show any financial gain to the farmer.

There are undoubtedly wide variations in lamb yields on different farms in Wales, and to some extent this is accounted for by the diversification of breeds and the use of cross-bred ewes. The influence of the age of the ewe on yield does not appear to be quite clear. Many lamb producing areas show a decided preference for four or five year old ewes, as it is maintained that the older ewes rear better lambs. If this is so, the increase in the price of the better type of lamb may more than compensate for any loss in yield from the older ewes. Apart from these considerations the question of raising the lamb yield on many farms merits the close attention of lamb producers.

With reference to the wool situation, is it not possible that the substitution of other fibres, such as cotton and artificial silk, or the blending of the latter with wool, may have a tendency to decrease the demand for wool, and to lower prices ? Recent happenings with regard to foreign exchange may show a tendency to strengthen prices in this country, but this influence must be of a temporary nature.

There appear to be, therefore, two influences working in opposite directions at present. Substitution tending to lower demand and prices, and the exchange situation tending to strengthen prices for manufactured goods. Both these influences are complex, and their separate effects are beyond measurement, consequently the position of the wool grower appears to remain somewhat obscure.

Mr. Llefelys Davies, in his excellent paper, gave a very clear and detailed picture of the organisation of sheep marketing as it exists in most parts of Wales and particularly in some parts of North Wales. The subject is so important and the problems arising out of its complexity are so numerous, that it may be a little difficult to determine in our minds some general landmarks to which we can look for purposes of discussion. For this reason, I am going to deal briefly with some of the general aspects of the subject. The question of improving the organisation existing in this country for the marketing of sheep is interesting to all of us, but it is of prime importance to a large number of farmers whose livelihood is almost entirely derived from the sheep industry.

How far is the organisation understood by those who operate it and those who depend upon it? Does it act in fairness to all the people concerned, be they producers, middlemen or consumers? Does the system function efficiently and well as far as modern knowledge, science and modern facilities for transportation and communication could make it function?

New knowledge and new methods should, if operative, tend to reduce the costs of distribution, but in actual fact whilst the means by which distribution could be more economically accomplished have become available the costs of marketing have shown a decided increase. Taken as a whole the marketing system for sheep in this country appears to be one of sheer chaos.

There is everywhere an obvious lack of organisation. We find no conscious central effort to guide and direct the valuable products of the sheep industry in the best directions. There is little if any conscious effort to arrange movements from producer to consumer. The farmer takes no part and accepts no responsibility in any way. Up to the present he has left the whole system to others. Consumers, in so far as they are organised co-operatively are safeguarding their interests, but those who are not organised in this way are as powerless to control the system as the farmers are. It may be said that the law of supply and demand governed by free competition is still an effective controlling factor. But is this so in practice? Farmers admittedly compete to sell and to depress their own prices accordingly. Consumers, to the extent that they are co-operatively organised, have ceased to be independently competitive as buyers. In between however, there are intermediaries who have successfully eliminated competition by means of rings and mutual agreements, and to the extent that this has been done both producers and consumers are held to ransom.

Why should such a state of affairs exist in view of our modern facilities for distribution? The whole system resolves itself into a

series of accidents which are many and costly, with no insurance scheme and with the result that most of the losses have to be met by the farmer. Week by week the old story is repeated. A farmer will go to market to find that supplies are short, buyers numerous, and prices well maintained. On the basis of this market he decides to take in his stock the following week, only to find that many other farmers had thought the same way as he had. High prices the previous week had reduced the buyers, whilst supplies would be greatly increased, and consequently there would be a glut and low prices. Such ups and downs occur from week to week with farmers trying to catch the market on the hop and generally failing to do so. We find that at certain times of the year a butcher can put a Welsh carcase in his window at a lower cost to himself than the cost of a Canterbury carcase, then, when he comes to selling, he can realise from a penny to twopence a pound more for the Welsh than for the Canterbury.

Again, a farmer living, say, within five miles of Aberystwyth might sell some of his lambs to a local butcher, and some to a dealer who in his turn, might send them to Birmingham paying quite a large sum for transportation. At Birmingham the lambs would probably go through the hands of another dealer who would in turn sell to a wholesaler, and he again would sell them to a butcher or a meat retailer. In spite of all the expenses involved, I have paid a penny a pound less for Welsh lamb in Birmingham than I have paid in Aberystwyth in the same week. I am not attaching blame to any particular person or persons. I am criticising the whole system which allows such conditions to exist. Is it not possible to bring reason and common sense to bear on the system in the interests of all concerned ? Is there any reason why all those who play a part in the work of production and marketing should not unite in a co-odinated effort to place the whole system on a more efficient and satisfactory basis ?

The market fails almost entirely to tell the farmer what he wants and ought to know. Different markets have their own peculiar characteristics of demand. There are also changes in the nature of demand in the same market from time to time, which may be caused by changes in the size of the average family or in the methods of catering, or a shift of demand from one kind of commodity to another. Whether caused by conditions of supply or merely by changed customs it is important that the farmer should be quickly and accurately informed of such matters so that he may change his methods of production accordingly. It is hardly reasonable to expect a farmer to change his methods when neither the marketing system nor the distributing trades are capable of telling him definitely what is wanted. It is obvious that farmers make serious mistakes, and although they are not wholly responsible for these, it is they who have to bear the losses which result. Very often, the products of the farm become objects for the playing of " pitch and toss " in the market, and the farmer is not a good player at that game.

Then there is the problem of price reporting. Does the market price quotation give the farmer any information which he can usefully apply to the valuation of his own products ? Prices are quoted in

most local newspapers. In Anglesey and some other areas in North Wales lamb prices are quoted per head, but Anglesey lambs are Wiltshire-Welsh crosses, whilst the Vale of Clwyd lambs are Southdown-Welsh crosses, and the lambs of Merioneth may be pure Welsh. All these are different commodities from the standpoint of demand, and are subject to different values but no distinction is made in price quotations. In Cardiganshire lamb prices are quoted per pound alive or dead. Generally the prices quoted are irrelevant to the exact nature of the commodity and the farmers who use them for purposes of valuing their own products may be misguided far more by such quotations than by anything else.

There are innumerable examples of extreme waste in the present system. It should be possible to mobilise the supplies of farmers so as to make it unnecessary for all of them to attend the mart and to waste a good deal of time. After first sale, stock often become the objects of speculation and are moved from mart to mart on consecutive days to their detriment. Under our present system of local slaughter in small private or public slaughter houses the methods of handling are inefficient and costly. Sanitary conditions are often unsatisfactory, and adequate inspection of meat is in many cases impossible. Valuable offals are entirely wasted and the loss resulting from this combination of factors is seriously reflected in the price of the live animals. Auctions exist in some places, not because they are necessary, but because, possibly a well-meaning auctioneer thought he would like to open business there. I attach no blame to any auctioneer or to any other individual, but when institutions of this kind are started here, there and everywhere, in competition with one another, their cost is heavily reflected in the reduced price of the live animal, apart from their tendency to reduce the numbers of buyers at each sale, and in too many cases to eliminate buyers' competition entirely. The whole cost of the system has to be met by the farmer, but I repeat, I attach no blame to individual auctioneers, many of whom have done and are doing, excellent work in the interests of farming. I do, however, condemn a system which fails so badly to fulfil the needs of agriculture and allows of the present scale of wastage and loss. There is ample scope for both producer and middleman to co-operate in its re-organisation, but the initiative must be taken by the farmer whose interests are least safeguarded under present conditions.

THE ORGANISATION OF THE TRADE IN WELSH MUTTON AND LAMB UNDER THE NATIONAL MARK.

Major W. H. WARMAN, Markets Division, Ministry of Agriculture.

The views of the Ministry in regard to the marketing of sheep, mutton and lamb were published this autumn in No. 29 of the Economic Series of Orange Books. It will be recollected by those who have read this Report that it is recommended that a scheme for bringing mutton and lamb under the National Mark on lines parallel to those adopted in the National Mark beef scheme should be devised and adopted when circumstances permit. The matter still stands in this position and, in consequence, in the present remarks it is not possible to treat the adoption of such a scheme as a certainty or to discuss marketing organisation as fully as might be done if the definite lines which this National Mark scheme is to take had been settled. Indeed, in some ways the object of the paper is rather to elicit information than to give it, since the final form of a mutton and lamb scheme must be influenced by the attitude taken up by producers and distributors in the important producing districts.

On the general question of the advisability of starting a scheme one or two remarks may be made. When the Ministry started the National Mark beef scheme it was told by the representatives of the retail trade that the scheme was unworkable. The fact that from the start of the voluntary scheme in London in October, 1929, to the end of September, 1931, over 500,000 sides were graded and marked of the total value, perhaps, of 6 million pounds seems to prove conclusively that this expectation on the part of the trade was altogether erroneous. Further, the extremely small number of complaints against the grading itself shows that, even with the diversity of cattle types which exists in the United Kingdom, it is just as feasible to carry out a simple grading system as in America, the Argentine or Australia where larger numbers and fewer types render grading a comparatively easy matter. The plain desire which exists among the majority of our fellow countrymen at the present time to buy British whenever possible, suggests that producers and distributors of the higher qualities of British meat would be making a costly mistake if they did not support a scheme which caters for this growing demand. In fact, although as is well known there has been opposition from certain trade interests, producers and consumers seem generally to be in favour of the National Mark scheme, and the main opposition in the meat trade comes from those who sell on the whole a greater proportion of meat which either because of its imported origin or its inferior quality cannot come under the National Mark.

For the general outlines of the proposed National Mark mutton and lamb scheme, reference can be made to Economic Series No. 29, but there are one or two points which may be usefully touched on here. It is probably known to everyone here, that in the beef scheme carcases are graded by Government graders at present in two or three

of the large centres of consumption, and are marked with a ribbon stamp which is run over the principal joints in such a way that in the great majority of cases a buyer has some part of the Mark on every joint of National Mark beef which he buys. There are no technical difficulties in the way of the use of a similar machine being used for mutton and lamb, though from experiments which have already been carried out, it is quite possible that it will be found better to put the grade marks on by means of a stamp applied successively to the most valuable portions of the carcase. It is, however, a question whether the example of the beef scheme can be followed in permitting Government graders alone to grade mutton and lamb. This arises from the fact that while in the case of beef, with one or two exceptions, cattle are generally slaughtered in large consuming centres, in the case of mutton and lamb there is a large trade in consignments of dead meat mainly from privately owned slaughterhouses in outlying districts, such as exist in Devonshire and the north of England, for example. It would be impracticable to maintain a staff of Government graders to carry out personally the actual grading and marking in the numerous establishments of this kind, and for this reason the suggestion has been put forward that a system such as is in use in Australia and New Zealand should be adopted by which registered owners should be entitled to grade and mark according to the grades laid down under the supervision of travelling inspectors in country districts, or of the Ministry's graders in consuming areas where the scheme was in operation.

I understand there is not any great amount of this export trade in dead meat from Wales. Supplies for the Manchester and Birmingham areas, for instance being sent alive to the abattoirs of those cities but, as I propose to point out later, a grading and marking scheme is of such advantage to a slaughterhouse in a producing area, that it may possibly be one result of the mutton and lamb scheme, if and when it is started, to encourage slaughtering in the producing areas for consignment to large cities and towns. This raises the questions of marketing organisation, but before I come to that, I should like to deal with one further point in connection with the scheme itself. It is well known that numerous as are the breeds and crosses of cattle, the breeds and crosses of sheep are still more numerous. In the case of cattle it was decided, wisely I think, to make no difference in the grade definitions between one breed and another. This is still more necessary in the case of mutton and lamb. There does, however, seem to be some justification for including in the Mark a general indication of the area from which supplies have come. The exact application of this principle would have to be worked out, but it should not be too difficult to include, say, a code letter indicating the actual source of any graded carcase so that, for instance, butchers who wished to build up a trade in Welsh lamb could guarantee to their customers that they would obtain the genuine article.

Some misconception appears to exist regarding the effect of the National Mark Scheme on marketing reform. For instance, it is argued by opponents of the Scheme that since supplies are graded as dead meat and farmers must commonly sell their stock alive, the benefits

of grading under the National Mark do not go back to the producers. But wherever grading is in operation, buyers are looking for the class of animal which they know from their experience is capable of yielding a select or prime carcase and hence competition for animals capable of yielding meat which can be put in the higher grades is thus directly stimulated. It is true that if farmers sell their stock in small markets, which have not large enough supplies to attract large buyers, this effect is blanketed, but undoubtedly there are too many small markets in England and, I understand, in Wales also, and anything which tends to discourage small markets for fat stock is clearly a step in the right direction.

Something more, however, is needed in the way of reorganising the trade than a reduction in the number of markets. Prices in general depend on the prices in the principal wholesale meat markets, and he would be a bold man who maintained that the wholesale meat market system, as we know it at present, works satisfactorily. I admit that as things are, commission selling is a necessity, but commission selling I feel sure, in the long run, is disastrous as a marketing system. It offers extremely small resistance to price declines, and when it is linked to jobbing, it quite plainly is disadvantageous to the farmer. No doubt, if a National Mark Scheme for mutton and lamb is started, it will have for a time, little effect on marketing organisation—as has proved to be the case with beef—but, as with beef, it will open the way to outright sale on a grade and dead weight basis, which if it spreads, will do away with the losses inherent in the commission system.

To say more on this point takes one into still more hypothetical regions, but there can be no harm in making a few remarks in a conference of this kind on Central Slaughtering. At the present time a Committee is sitting in London on this subject and is likely to issue its report shortly. I cannot anticipate its findings, but it is obvious to most people that sooner or later this country, which is now looking round to secure economy and create more wealth at home, cannot remain content for ever with its present antiquated slaughtering arrangements. Let us for a moment suppose that central slaughtering is made a policy, and becomes, say in the next ten years, the accepted method of processing between the farm and the shop. If that is the case, and you have a National Mark Scheme, not merely confined to a few large cities, but carried out wherever a central abattoir exists, I am convinced that it would have a profound reaction on present marketing methods.

I am, however, also convinced that the benefits of such a system, considerable though they would be in any case, will not be fully shared by the farmers without some effort on their part. It is easy to argue that if you have, say, better flaying, as you nearly always do have in a large abattoir, the farmer's product is thereby made more valuable and he will obtain some of that value, and the same applies to better treatment of fats and inedible offals and to an economic use being found for the glandular products now largely wasted. But one cannot blind one's eyes to the fact that it may be possible to have a highly developed technique of slaughtering, as you have in some

of our Dominions, in the Argentine and in the United States of America, and yet the farmer may be failing to get all that he might get with greater marketing control. The Marketing Act in this country is still new and admittedly experimental, but if such a system exists and puts it into the power of producers to create selling agencies which could be really effective, because they could not be undercut, then it seems to me that if the time comes when your buyers, as would be the case with a central slaughtering arrangement, were comparatively few in number, selling agencies under that Act would become an urgent necessity.

I will even go further than that. The State has up to the present, in the case of the National Mark Beef Scheme footed the bill, but it has already been indicated that the expenses of grading and marking must in the long run be borne by the product. Remembering the achievements of the New Zealand Meat Producers' Board—and remembering for instance that in your own Principality, if you are going to develop a much larger trade for the increased production, which we have almost been promised at this Conference, it will be essentially an export trade to large centres of consumption—I feel that, as time goes on, producers will not grudge the fraction of a penny a lb. which it takes to grade and mark meat but will take over some part of the control for advertising and promoting in every way the sale of graded British mutton and lamb.

THE MARKETING OF WOOL.

Mr. J. Morgan Jones, M.A., Markets Division, Ministry of Agriculture.

(i) Introductory.

The total clip of Great Britain weighs about 110 to 120 million pounds. The total retained imports in this country may be taken as about 500 million pounds. The British clip, therefore, is roughly one-fifth of the supplies of the consuming industry, but of this one-fifth nearly one-half is exported in most years, and at an estimate it may be taken that British grown wool meets about 12 per cent. of the needs of the consuming industry in normal years.

The home clip is mostly produced in very small units, and within each unit the variation in type of wool is very considerable since there are 40 breeds of sheep in this country, without considering numerous crossbreeds. The following quotation relating to a year of wool control during the war is illuminating on the question of the size of flocks :—

> "About 60 million lbs. (of wool) were obtained in England and Wales, 20 million lbs. in Scotland and 10 million lbs. in Ireland. The number of farmers whose wool was bought in Great Britain was 136,000 and nearly two thirds of the wool bought consisted of small lots of under fifty fleeces."

The quality of the wool varies very greatly from Scotch Blackface, which is used mainly in the carpet industries, to South Down wool of fine spinning qualities, which meet speciality demands. None of it reaches the highest standards and is of the quality of Merino wool which represents the bulk of the production of Australia and South Africa, but it nevertheless meets important demands both at home and abroad. The best quality Welsh wool, for instance, may be used in the hosiery industries, or for tweeds, while the poorer qualities are used for the manufacture of blankets.

On the whole, the wool of this country is produced in small flocks of mixed quality—conditions which make efficient marketing difficult. It is only in the mountain regions and in certain breeding areas that large flocks of homogeneous breeds are to be found, and even here the biggest flocks cannot be regarded as anything but small when comparison is made with production conditions in Australia.

The preceding remarks show the diversity of production. There is comparable diversity in the demand for wool on the part of the intricate manufacturing industry, the raw material of which is wool. Before reaching the " consumer," wool must pass through a number of adaptive processes such as scouring, sorting and combing. These processes require accurate knowledge of consumers' requirements, considerable capital, and take time—during which prices may change very considerably. In short, the path between the grower and user of wool is long and winding.

(ii). Marketing Methods.

(a). Farm Selling.

Probably 75-80 per cent. of Welsh wool is bought on farms partly by specialist wool merchants and partly by non-specialist dealers who have no knowledge of wool, although in past years owners of country wollen factories have entered considerably into the trade. The buyer with knowledge of wool performs very useful functions. He buys wool at clip time, parcel by parcel; stores it; bulks it; grades and often sorts it; and sells it either to the merchant topmaker or to the manufacturer throughout the season in the quantities and at the times demanded by them. The non-specialist does little else than pass on the wool to others. More often than not he is a cattle dealer or fertiliser merchant with no knowledge of wool and the persistence of the system by which he buys is attributable to the fact that farmers are continually in debt to him.

Criticism of farm selling.

The fundamental fault to be found with the system of farm selling is that the seller is invariably in a *weak bargaining position.* He knows nothing whatsoever of the quality of wool. A farmer has no means of measuring yield, which is an extremely important factor in the valuation of clips. The yield of Welsh wool is usually high—about 80-90 per cent.—but it may fall as low as 60 per cent. The valuation of

wool is the work of an expert and farmers cannot be expected, and certainly have not time, to gain the necessary experience which will enable them to meet the buyer on equal terms. It is true that in times of rising prices a farmer with a keen sense of a bargain can sometimes play off one buyer against another, or hold out for a higher price, but that does not affect the fundamental criticism, namely, that no-one can sell to the best advantage, a product of the value of which he is entirely ignorant. The farmer's weak selling position, accentuated in many cases by lack of *storage facilities and financial resources*, results in buyers paying a flat rate price for a clip or over a whole district, irrespective of quality. Consequently no encouragement is given to improved production and preparation for market. The general result is that the get up of the clip is bad and the presence of off sorts and dirt reduces the value of the good fleeces. The system does not pay the producer a price which has ever made him look upon his wool as anything more than a by-product and, not seeing a reward in price, growers have often abandoned progressive methods.

(b). **Country Auctions.**

In North, East and Mid-Wales especially, auctions have been a great improvement on farm selling because :—

(i) they are more economical—buyers need not visit each farm.

(ii) they enlarge the field of competition by bringing in new buyers.

(iii) there is more discrimination for quality.

On the other hand the present country auction system as a whole is defective at several points :—

(i) Many auctions are too small to secure adequate competition : at a number of auctions only 5-10,000 fleeces are offered.

(ii) Adequate facilities very often do not exist for the proper inspection and temporary storage of the wool.

(iii) The seller is not in a strong position—he has little option but to accept the price offered and is in no position to dispute claims for faulty packing.

One criticism is common to both the methods of sale previously discussed. *They are wrong in principle since each clip is sold individually.* Some method is needed whereby :—

(i) the differences in quality within each lot are reduced before the wool is first offered for sale.

(ii) the size of each lot is increased. The buyer always wants to buy big lots of even character, otherwise he must, in his own defence, make considerable allowances for off-sorts and for the fact that to buy fifty lots of wool where he might buy one costs him a great deal of money.

(c). **The English Wool Co-operatives.**

There are now six Co-operative Wool Societies in England, all started since the War. Hitherto they have all survived the struggle of the past two seasons. The essential thing about them is that the wool of each supplier is put into a *grade pool*, i.e., individual clips lose their identity.

Summary of Methods.

(i). Farmers are supplied with bags and labels and asked to pack ewe, lamb wool, etc., separately.

(ii). Outside a certain radius from its depot the Society usually arranges for the collection of the wool.

(iii). On arrival each farmer's lot is weighed.

(iv). It is then graded and the weight going to each grade is ascertained.

(v). The farmer is paid an advance—up to about 60 per cent. of the value of his wool.

(vi). The wool is baled.

(vii). Sample bales are sent to London.

(viii). Wool is sold on the London Wool Exchange, the bulk being delivered direct to buyers.

(ix). The grower is paid the balance due to him, calculated on the average season price of each grade sent in by him.

One Society does not bale and sells by private treaty and not in London.

It will be seen that by this system—

(i). Producers are paid on a quality basis.

(ii). Bulking of lots and sale in London ensures competition.

(iii) **Overseas Experience.**

To show that the English Societies are adapting their methods to basic conditions in this country, i.e., small size of flocks and mixed breeds, a word on overseas developments would be helpful.

Australia.

In Australia 90 per cent. of the wool is sold at great central auctions at the ports of despatch by specialist wool brokers. The system has been built up on large scale production and has worked extremely efficiently for large flocks of say 5,000 sheep and upwards. The broker is a specialist. His job is to sell wool. The wool is very carefully prepared for market on the station, skirted and classified, and there is very keen international competition from all consuming countries which send out representatives from Europe, the Far East and America

to buy for them. The whole system is strictly regulated by brokers, producers and buyers, acting in conjunction through representative bodies.

Bulk-Classing. It has been found that since the introduction of mutton sheep, the breaking up of many large stations and the emergence of smaller and more mixed flocks, the central auction system does not operate at full efficiency for, as has been stated, the buyer wishes to purchase large lots of wool of even quality and competition is never keen for small mixed lots. A new system, known as *Bulk Classing,* has therefore been growing up since the War. The small clips are sent in to the broker's premises without previous classification. They are bulked and graded by the broker and the weight of wool falling into each grade is notified to the producer. They are then sold under the broker's own mark in big well-graded lots and meet with keen competition from buyers. In effect, the broker who shares the interests of the grower, sets up a number of grade pools for small clips.

United States of America.

Here again the same problem has arisen, but unlike Australia, the United States had no organised central auction system. In fact, the position corresponded in many respects to the position in this country, except that a local auction did not exist. Practically the whole of the wool clip was sold by private treaty either to merchants or their agents or to manufacturers direct. Since there was no organised brokerage system upon which to build, the producer has had to start from the bottom and organise his own co-operative societies. The principle which lies at the back of the co-operative wool societies both in North America and in this country, is exactly the same as with bulk-classing in Australia; that is to say, grade pools are set up, the clips are bulked and graded before sale and the individual producer's clip loses its identity.

It is true that the American co-operatives differ very considerably from those in this country in that they sell very largely direct to manufacturers.

(iv) **Market Organisation in this Country.**

Basic Services.

This survey has shown that the co-operatives in this country are on the right lines although there are several problems which they have yet to solve.

It is quite certain that a sound market organisation to meet the problems of this country must perform the following functions:—

(i) Assembly.

(ii) Storage.

(iii) Grading and Bulking.

(iv) Selling.

(v) Credit.

Questions of Policy.

It is assumed that the objective of organisation is to secure the greatest net return for wool growers. In this connection it must be emphasised that exacting anything in the nature of a monopoly price for home-grown wool does not arise since the level of wool prices in this country will always be determined by the price of imported Merino and the finer cross-breds. Consequently, the scope for organisation lies in the direction of securing economies in the assembly and adaptation of wool and in its transport to consumers at home or abroad.

Having stated the need for a grade pool, the points to consider are :—

(i) The preparation of the wool in a form to secure maximum competition.

(ii) The selling of the wool in the most advantageous markets.

(iii) The costs of preparation for and selling in these markets.

These points can broadly be considered under the following two main heads :—

Sale in Central Markets.

Should the present co-operative policy of selling in London be continued ?

Against—

(i) It is often considered that the expense of selling in London—especially as regards the despatch and storage of 25 per cent. samples—is excessive.

(ii) London, as a market for English wool suffers because so small a proportion of the home clip is offered there. The merchant or stapler has generally bought up most of what he wants before he goes to London and he is, therefore, not under the same necessity of bidding up to his limits as he would be if he knew that unless he bought in London he could not buy at all.

For—

(i) Sale through Central Auction is not too difficult to establish and has the sanction of experience.

(ii) London is the most important international market for wool.

(iii) In view of the fact that half the home clip is *exported*, the grower should benefit from selling in a market where home and overseas buyers are in direct competition.

(iv) With comprehensive organisation of producers it should be possible to reduce costs of selling in London.

The establishment of large scale auctions for home wool in Liverpool might also be considered, since there is here a speciality demand for carpet wools.

Sale by Private Treaty.

One English Society situated near the wool consuming areas, has, in common with the Scottish Wool Growers, begun to sell by private treaty to manufacturers. The soundness of this procedure as a matter of general practice must be judged in relation to the following factors.

(i) There are undoubtedly some areas where the wool is fairly uniform in quality and can be passed on to manufacturers with relatively simple grading.

(ii) The bulk of the wool, at any rate outside the mountain areas, must pass through intermediaries who perform the processing and commercial functions now done by the specialist wool merchants.

(iii) If an organisation of producers is to perform these functions, it must have detailed knowledge of individual manufacturers' requirements, a first rate selling organisation, sufficient permanent capital to sink in plant, sufficient working capital to provide credit and cover risks and *control over a large reservoir of wool*, so that manufacturers can be supplied with the quality and quantities required.

These considerations are put forward for those who are planning organisation in Wales. At this stage it is impossible to dogmatise as to where and in what form it would pay producers best to sell their wool, whether for example, it would pay a producers' organisation to make Welsh matchings or have some wool combed into tops before sale.

Neither is it necessary to map out the form organisation should take. Welsh wool growers have the experience of the English Societies before them and the guidance of overseas organisations. They must consider whether they will form regional organisations and link these up through a federation, or whether they will set up one organisation for the whole Principality. The Agricultural Marketing Act provides the basis for that type of organisation best suited to the needs of each area.

Statement showing the number of each class of Sheep in Wales and Monmouthshire as returned on the 4th June, 1930.

Ewes	1,877,364
Rams and Ram Lambs	54,304
Others, 1 year and over	513,468
Under 1 year	1,657,269
Total Sheep of all breeds and crosses	4,102,405

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31. **Marketing of Calves and Veal. (In preparation).**
32. **Marketing of Hides and Skins. (In preparation).**
33. **The Agricultural Marketing Act, 1931.** (*8d.*)
34. **Organization of Potato Marketing.** (*9d.*)
35. **Organization of Wool Marketing. (In preparation).**

Other Reports are in course of preparation.

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* Out of print.