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*Presidential Address*

ANIMAL PRODUCTION AND THE SOCIETY

J. W. STICHBURY

*N.Z. Dairy Production and Marketing Board,  
Wellington*

AT THIS, the 25th conference of our Society, it seems appropriate for the presidential address to review progress in animal production since the Society was formed and to make some observations on its future.

However, in doing so I am very conscious of my limitations, particularly in regard to developments outside the dairy industry. Consequently, the dairy industry will undoubtedly receive greater emphasis than it should if my remarks were to be a balanced account of progress in animal production. I trust that members who are more closely concerned with animal production outside the dairy industry will excuse the somewhat cursory attention given to their achievements.

As the Society's first president, J. M. Ranstead, pointed out at the Society's first conference, in animal production all roads lead back to the soil. Research over the past twenty-five years has resulted in the characteristics of New Zealand's soils being much better understood and has led to the discovery and correction of soil deficiencies affecting both plant growth and animal health. That most New Zealand soils were deficient in phosphorus had, of course, been known for many years, and the development of a major phosphatic fertilizer industry had already taken place prior to the founding of this Society. Research had also shown that a deficiency of cobalt in the soil was the cause of ill-thrift in both cattle and sheep grazed on the pumice soils of the central plateau of the North Island and certain other soil types in both islands. The effective use of this information by the application to deficient soils of fertilizers such as cobaltized superphosphate and the development for livestock farming of areas previously considered worthless for the purpose has, however, largely taken place during the life of this Society.

Work carried out in more recent years has provided information on a number of other soil deficiencies of considerable economic importance. In this category can be included the finding that a deficiency of potassium was a major factor limiting plant growth on many of our economically most important soils and the recognition that many soils, particularly those in the southern part of the

South Island were deficient in sulphur and molybdenum. Those who have seen the spectacular response of clovers on deficient soils to the application of a few ounces of sodium molybdate per acre can have little doubt about the great economic value of this work.

On the animal health side, reference can be made to the discovery of the significance of the copper/molybdenum ratio in peat soils and the resulting development of the practice of topdressing peats and some other soils with copper sulphate to enable healthy animals to be reared. More recently selenium has been found to be deficient in certain soils with resulting effects on the thrift and fertility of sheep in the areas concerned.

Finally, no reference to the correction of soil deficiencies would be complete without mention of the rapid growth of the aerial topdressing industry. Trials initiated in the late 1940s resulted in the development of this industry which has undoubtedly played a major part in increasing the productivity of our hill soils in particular. It is worth noting that the total acreage topdressed in New Zealand has more than doubled over the past 25 years. More than half this acreage is now topdressed by plane and nearly half the total phosphatic fertilizer used is applied by this means.

The plant breeder has developed new strains of grasses and clovers with both increased total production and a better seasonal spread of growth. The best known of these new strains are undoubtedly those resulting from selection and hybridization of the ryegrasses. But valuable work has been done with other grass species such as cocksfoot, while work with white clover in particular has led to more productive strains having the ability to fix larger quantities of atmospheric nitrogen, a basic factor in the production of large quantities of pasture at low cost under New Zealand conditions.

The plant physiologist and the pasture ecologist have defined many of the factors influencing pasture growth and in conjunction with workers in animal husbandry have helped to develop pasture and stock management systems designed to take practical advantage of this knowledge.

Dramatic advances have been made in the control of weeds and insect pests through the work of the chemist and the entomologist. It is unfortunate that the control of the most important insect pests is at present hampered by the need to keep insecticide residues out of animal products.

Workers in animal husbandry have demonstrated the importance of stocking rate in increasing the efficiency of

pasture utilization and maximizing output per acre. The nutritionist has provided information on the feed requirements of grazing animals at different stages of growth, pregnancy and lactation which become of increasing importance as stocking rates are raised.

Considerable advances have been made in breeding and selection methods, particularly in regard to dairy cattle. The system of progeny testing dairy bulls, in existence at the time this Society was formed, has been considerably modified to take into account knowledge gained on the inter- and intra-herd heritability of milk and butterfat production. This progeny testing system has formed the basis for selecting bulls used in an artificial breeding scheme entirely developed during the life of this Society and now used by 40% of dairy farmers. Research into semen production, processing and insemination techniques has resulted in a spectacular increase in the number of inseminations which can be made per bull and the conception rate obtained with this method of mating. The contribution of research in this field is well illustrated by papers presented to conferences of this Society. At the first conference in 1941, J. P. James presented a paper on work carried out at Ruakura in which he estimated that during a three-month period some 750 inseminations could be made with semen collected from a mature bull. This number of inseminations is now frequently exceeded with the semen obtained from one service collection.

Work on sheep and beef cattle breeding has provided information on the value of different breeds and crosses for meat and wool production. A new breed of sheep, the Perendale, has been evolved as a result of work carried out in this field. Objective methods of assessing the meat producing qualities of breeding stock have been developed and are in use. But, with the possible exception of the pig industry, it could hardly be said that meat producers have shown any marked enthusiasm for the replacement of traditional methods of selection based on eye appraisal.

Pig production techniques have been investigated and methods have been developed to reduce losses at farrowing, improve nutrition by making optimum use of different foodstuffs, and to take advantage of heterosis in breeding programmes. A national pig breeding centre has been opened and is playing an important part in the development of the pig industry.

Husbandry practices such as pre-mating flushing of ewes have been shown to lead to increased lambing percentages. In the Romney breed face cover has been shown to be negatively correlated with fertility. This finding has resulted in breeders reducing the emphasis placed on this character in selection and should lead to the fertility of the breed being increased.

Considerable progress has been made in the control of infectious diseases of both sheep and cattle. Notable examples in the dairy industry are the control of brucellosis by calfhooed vaccination and the use of penicillin and other antibiotics to treat mastitis. Figures available show that, prior to the widespread use of Strain 19 vaccine, 20% of two-year-old and 8% of older cows aborted annually, whereas the figures are now 3.6% and 2.6%, respectively. While the incidence of mastitis has remained unchanged, about 12% of cows showing clinical symptoms each year, the number of cows culled for the disease has shown a dramatic drop from 22% of all wastage at the time when our Society was formed to under 5% in the 1961-2 season.

Starting with herds supplying liquid milk for city consumption, a scheme for the eradication of bovine tuberculosis in dairy herds, by testing and the slaughter of reactors, has been introduced and is being actively prosecuted. Similar schemes have been suggested for the eradication of other infectious diseases such as brucellosis.

Certain of the non-infectious diseases of sheep and cattle continue to be problems. Thus the incidence of bloat in cattle, although subject to wide seasonal fluctuations, appears to be increasing. The spraying of anti-foaming agents on to the pasture has, however, been developed as a method of controlling the disease in dairy cattle and, although time-consuming, where properly carried out appears to be a very useful interim control measure. The discovery that the fungal toxin, sporidesmin, was the cause of facial eczema has been a major step forward in research aimed at controlling this disease.

Husbandry practices have received considerable attention and have resulted in some marked changes in farming methods which have not only improved the productivity of our livestock industries but have also had a very considerable effect on labour requirements. Examples of this in the dairy industry are the research on simplified methods of calf rearing, the value of rotational grazing of young stock and, in particular, research and survey work on milking methods. This has resulted in the almost universal adoption

of non-stripping and, more recently, the widespread acceptance of the principle of batch milking in the elevated, herringbone milking shed.

Research in animal production is, however, of little value unless the results are applied by the farmer and here our advisory services have played a very important rôle. Although in some instances handicapped by over-specialization of the advisers, the demand for and availability of advisory services has steadily increased. At the time our Society was formed, advisory work in animal husbandry was almost entirely the prerogative of the veterinarian and certain other specialists such as pig advisory officers. However, beginning with the setting up of the Dairy Board's Consulting Officer service in 1940 and the later development of the Farm Improvement Club movement and the Farm Advisory Division of the Department of Agriculture, there has been a general move towards making all advisory officers responsible for advising farmers on animal husbandry practices. The value of the "whole farm" approach to advisory work is probably generally accepted now by those responsible for the control of advisory services.

In this necessarily very sketchy account, I have endeavoured to outline some of the fields in which research has provided knowledge that should result in increasing the productivity and efficiency of our livestock industries. What has in fact happened?

The first observation that can be made is that there has not been an increase of any consequence in the area of occupied farm land, which has remained at approximately 43 million acres. While the proportion of this which has received some form of cultivation and been sown to grasses and clovers has increased, the most significant development is undoubtedly the increase of over 100% in the area top-dressed, now some 10 million acres annually.

Thus, any increases in livestock production which have taken place over the past 25 years have in the main resulted from increasing the productivity of already farmed land.

The most spectacular increases in both livestock numbers and output of animal products over the past 25 years have occurred in the sheep and beef cattle industries. The number of sheep has increased by 57% to over 50 million, while the number of beef cattle has increased by 78% to over 3½ million. The volumes of meat and wool produced annually have increased by 78 and 89%, respectively.

By contrast, expansion has been much slower in the dairy industry and the number of dairy cows in milk, now just

over 2 million, is only 17% above the figure of 25 years ago. However, as there has been an increase in production per cow of approximately 50 lb butterfat over the period, total dairy production has increased by nearly 40% but this rate of increase is still only half that achieved by the meat and wool industry.

A closer examination of production trends shows that most of this difference in rate of increase has taken place over the last ten years. The increase in the productivity of our different livestock industries was similar from 1938-9 to 1953-4. Since 1953-4, however, there has been a rapid increase in the output of meat and wool, whereas, apart from minor seasonal fluctuations, the volume of dairy production remained virtually static from 1955-6 to the end of the 1961-2 season. Increases in total dairy production have, however, occurred in both of the last two seasons each of which in turn established a record for total dairy production.

There is nothing new about these facts and they have received considerable publicity from representatives of a wide range of interests. Research workers, economists, both lay and professional, and farmers from their different points of view have argued that there is a clear indication that the dairy farmer has been either unwilling or unable to increase production. There has, in fact, been a real danger of the very important rôle which could be played by the dairy industry in increasing national income not being appreciated.

Those who have expressed such views have failed to appreciate that the high prices received for wool in the early 1950s and to a lesser extent for meat since then have not only stimulated production on sheep farms but have also persuaded many dairy farmers to forsake the dairy cow in favour of the breeding ewe and the beef animal.

This trend is shown by the changes in the number of farmers who supply milk or cream to dairy factories. From a peak of just under 72,000 in 1933-4 the number had decreased to 66,000 in 1938-9 to 50,000 in 1953-4 and in 1963-4 to under 32,000. Thus, in the last ten years there has been a reduction of nearly 40% in the number of dairy factory suppliers. Many of these were small suppliers with fewer than 10 cows, whose loss to dairying would not greatly affect total production. Nevertheless, the number of suppliers with herds of 10 or more cows has decreased by approximately 7,000, or nearly 20%. Conversely, the number

of sheep farm owners has, during the same period, increased by almost the same number.

It is clear from these data that the dairy industry has lost a considerable proportion of what would undoubtedly be larger farm units to the sheep and beef industries. The fact that dairy production has, despite this loss, been maintained and is now being increased can, therefore, only be due to increases in efficiency achieved on farms still used for dairying. Conversely, the increases in meat and wool production which have occurred since 1953-4 cannot all be credited to increased efficiency on sheep farms.

Data are not available to enable an exact comparison of the changes in productivity on sheep and dairy farms to be made. But an examination of all the relevant data which can be obtained indicates that the average output per acre on dairy farms has probably increased by between 35 and 40% over the past ten years. On sheep farms a similar or possibly slightly smaller increase has been achieved.

The reason for the swing from dairying to sheep farming is almost certainly that dairy farmers with larger farms, while reducing their gross income by changing to sheep farming, will not reduce their net income to anything like the same extent, provided the labour force on the farm is reduced, as is normally the case. Similarly, the farmer developing a large farm may supply a dairy factory until such time as the productivity of his farm has increased when a change to sheep farming may be made to avoid the need for employing labour and to obtain the social benefits of the removal of the twice-daily milking chore.

While such a change may be eminently satisfactory from the point of view of the individual farmer, it should not be viewed with disinterest by the country as a whole. Unless there is a marked change in the relative prices for our major animal products, the effect can only be to reduce overseas earnings and to transfer labour from an industry with a considerable potential for increasing overseas earnings to secondary industries with little or no potential for doing this.

Having raised the problem I will, I imagine, be expected to offer a solution! Failing the unlikely event that the State will be prepared to subsidize people to remain in dairying, the remedy must lie in either making it economically very difficult for people to move out of dairy, for example, by endeavouring to restrict the size of dairy farms, or by removing as far as possible the features of dairying which make it a socially unattractive occupation. This is the

course I would favour. An aspect which I consider deserves considerable attention is the desirability of encouraging larger dairy farms, which would employ several labour units and thus enable their owners and their employees, by working a form of shift work, to enjoy some of the amenities at present experienced in other industries.

Examples of this approach exist at present. These farmers are pioneers of another type and their special problems should be borne in mind by those engaged in research, in particular research into farm management and economics. Not all farmers would wish to nor would some be fitted to operate a large-scale dairying enterprise. But this is no reason for placing obstacles in the way of those willing and able to do so. Discouragement of the efficient is hardly the way to make progress and it is pleasing to note that the repeal of the land aggregation laws has been one of the recommendations of the Agricultural Development Conference.

However, I am not an economist, a sociologist, or a politician and I have probably ventured much further into these fields than is prudent. Accordingly, my final remarks will be directed to the future of animal production and the rôle which our Society might play in this.

It is clear that increased animal production must be achieved by increasing the productivity of land at present used for this purpose. What is the scope for improvement? At the 1963 Ruakura Farmers' Conference, J. B. Hutton presented data from which he calculated that levels of production approaching 1,000 lb butterfat per acre were theoretically possible. While the sceptics, such as myself, may not take this too seriously at present, we would do well to remember that in the early days of this Society equal scepticism was directed at predictions that 500 lb butterfat per acre was an attainable target and that such a level has now been achieved. It is important that those who are concerned with improving pasture productivity and the efficiency with which pasture is converted into animal products should make predictions on theoretical yields of animal products. Such predictions not only act as a target but also stimulate discussion and research with the object of discovering the links in the animal production chain which appear to require attention before actual achievement can approach the theoretical target.

However, as an objective for the immediate future, the level of 500 lb butterfat per acre already achieved on research and demonstration farms and its approximate

equivalent in the sheep and beef industry, 500 lb meat per acre plus wool, would appear to be a practical target for at least our most productive soils. How close are we to achieving this?

A survey carried out by the Dairy Production and Marketing Board during the 1963-4 dairying season covering nearly 70% of the dairy farmers in the country shows that the average level of production per acre on completely self-contained dairy farms (that is, farms where the sole source of farm income is from dairying, where replacement stock are reared on the farm, and no feed is purchased) is just over 160 lb butterfat per acre.

On the face of it, it would appear that an increase of 200% is possible with present knowledge, but in making comparisons between levels of production per acre achieved on research and demonstration farms and achievements on commercial farms it is, of course, essential that the comparison be made on the same basis if it is to have any meaning.

The level of 500 lb butterfat per acre achieved on research and demonstration farms has quite properly been calculated by dividing the production obtained from cows not competing for feed supplies with other classes of stock, by the area of pasture they are grazing. On the other hand, the production figures quoted for commercial farms are based on production credited at the dairy factory, which is normally 10% below "on-the-farm" production, the total area of the farm is used to calculate production per acre, not just the area grazed, and the cows compete for feed supplies with other stock.

When allowance is made for these factors, it appears that the level of 500 lb per acre credited to research and demonstration farms is equivalent to a production of approximately 350 lb butterfat per acre on the basis used to calculate production per acre for a self-contained dairy farm. Further, it would appear reasonable to confine the comparison to the areas in which the research and demonstration farms are located. The self-contained farms in these areas have an average production of close to 200 lb fat per acre with the highest producing farms producing round 350 lb fat per acre, the same level as the research and demonstration farms.

Thus, it would appear that the immediate potential for increase in dairy farm production is from 200 to 350 lb fat per acre or 75% and that the highest producing farms are already producing at this level. Suggestions that research

can be halted while farmers catch up are therefore quite unrealistic. On the contrary, research will be needed to discover methods which will enable the higher producing farms to approach more closely the theoretical level of 1,000 lb fat per acre or, what is likely to be of equal importance, to discover how farmers are doing it. In achieving this, the results of farm management research and the deductions of informed farm advisers and farmers must be considered along with the results of planned experimental work.

We will obviously need more precise answers than are at present available to questions such as types of fertilizers and economic levels of application on different soils; the best pasture species and strains for different purposes. Should we, for example, continue to use a standard ryegrass-white clover pasture in the many different environments where it is at present used, or is there more scope for a "Perendale" pasture? What is the importance of palatability? How can insect pests be best controlled? What are the effects on animal efficiency of variations in feed supply, and how can this information be best used to develop optimum farm and pasture management systems for varying conditions? What are the best methods of controlling disease in our herds and flocks and which diseases should we endeavour to control first? Is it possible to simplify the data we at present collect in order to select breeding stock, and what are the conditions under which our traditional dependence in the North Island at least on the Aberdeen Angus, the Romney, the Southdown and the Jersey should be changed? Can milking methods be still further simplified without lowering production, and does selection of breeding stock have a part to play in this? How can hygiene be best improved to produce a higher quality product, and what is the real rôle of the dairy industry in helping to increase meat production?

This list can undoubtedly be extended *ad infinitum* and many will undoubtedly consider they know at least some of the answers. My purpose in drawing up this list is, however, not to present an exhaustive or even accurate blueprint for future research but to emphasize that future progress in animal production depends on the efforts of people trained in a wide variety of scientific disciplines and, ultimately, the farm adviser and the man without whose efforts all else is in vain, the farmer.

It is in this context that I should like to refer to the future rôle of this Society, particularly as the results of

a questionnaire on this subject, presented to members at the last conference, made it clear that many members desired to have more papers of a general nature presented at annual conferences.

Previous presidents have pointed out the necessity for farm advisers to take the whole farm approach when advising farmers, a viewpoint with which there can be little argument. However, little if any reference has been made to the dilemma in which the farmer adviser is sometimes placed in endeavouring to adopt this approach. What is the adviser to do if the adoption of a research finding which, while perfectly valid in improving the aspect of animal production in which the research has been carried out, will lead in his view to a reduction in the overall efficiency of animal production on the farm? Such could, for example, be the effect of methods recommended for improving dairy hygiene, the milking of cows and control of disease if their application might lead to a reduction in the rate at which stocking rate could be increased. Thus, there is a clear obligation on research workers also to consider the whole farm approach when planning their research and making recommendations based on this research.

Fortunately, this has not been as serious a problem in this country as I believe it to be in some other countries. This is undoubtedly due to the calibre of our research workers, the leadership they have been given by research administrators, the way in which the organization of agricultural research and higher agricultural education has placed people trained in many different scientific disciplines in the same institutions or areas and, last but not least, the willingness of research workers to debate their findings with farmers and advisory officers. There has been very little of the attitude typified by an overseas research worker who informed me that he was not really interested in discussing his results with workers outside his own field or in playing any part in the practical application of his findings. Had this person delivered a paper to one of the early conferences of the Society, his views would almost certainly have been challenged. If one reads the *Proceedings* of the early conferences, one cannot fail to be impressed by the vigour and occasional acrimony with which research results and in particular animal production policies were debated. Only those who were present will know what was really said when the *Proceedings* recorded members as "emphatically disagreeing" with the speaker.

Since those days, while individual members have expressed strong views on the subject, the Society as a whole, as was pointed out two years ago, has never really been sure of the rôle it should play in animal production. Obviously it cannot nor should it attempt to fill the rôles which are more properly the function of societies catering for the specialized interests of soil workers, chemists, geneticists and veterinarians. Equally clearly, it provides possibly the only forum in which many workers in fields such as animal physiology and animal husbandry can present their results. But how shall we interpret the request of members that more papers of a less specialized nature be presented at our conferences? One step we could take would be to encourage members trained in different disciplines to take part in symposia, particularly when the work to be discussed is such that it is likely to play an important part in determining animal production policies or, as will sometimes be the case, when it may result in legislative action. As has been frequently demonstrated, particularly in other countries, legislative action can have very profound effects on animal production for many years to come. Proposals for further legislative action should, therefore, be of interest to all concerned with animal production. But only a very small proportion of veterinarians, for example, who as a group are closely concerned with both the drafting and administration of legislation affecting animal production, are members of this Society. We should also be concerned by the fact that prominent farmers and advisory officers on resigning from the Society have stated as their reason that the papers presented are such as to give them little opportunity to enter into the discussion. They would undoubtedly have such an opportunity if the Society were to present a symposium on such a subject as, "The scope for eradicating diseases of livestock and the desirability or otherwise, from the point of view of the efficiency of animal production and the economics of the livestock industries, of initiating schemes for eradicating disease, compared with measures to improve methods of control and treatment". Such a symposium would enable workers trained in a number of different disciplines to contribute, while I for one would be interested to hear their views and to enter into the subsequent discussion.

It is to be hoped that, in the years to come, this Society will not just live for its *Proceedings* but that the *Proceedings* will also record the life of the Society.