Presidential Address

LOST POTENTIAL—A MATTER OF NATIONAL CONCERN

K. L. MACMILLAN

We judge ourselves by what we feel capable of doing, while others judge us by what we have already done.

Henry Wadsworth Longfellow

This quotation succinctly defines the present situation in the livestock industry. We have continued support advocated through use of figures which "prove" the economic worth of the livestock industry to the national economy. Incentives are promoted as ways of increasing production towards levels which other figures show to be conservative estimates of the industry's potential. These attitudes are common to industry spokesmen, individual farmers, advisers and scientists.

Scant regard is paid to the industry's collective performance in terms of stock units (s.u.) and output/animal on a national basis. These parameters have not changed significantly during the last decade. This could suggest that numerous incentives have only been effective to the extent that they have prevented a decline in production. The substantial expenditure associated with the development of indigenous energy production in New Zealand in the next decade is likely to mean that government finances will have to be reallocated. If the performance of the livestock industry during the 1970s is taken to mean that the industry is either not capable or not willing to produce to potential, then its case for continued support and stimulus is a tenuous one.

The industry must show either that estimates of potential production are unrealistic, or that a variety of socio-economic, technical and seasonal factors have interacted to nullify genuine interest and attempts to increase production. I intend to highlight the importance of some of these interactions from the point of view of the nation, the individual farmer, the adviser and the scientist.

THE NATIONAL VIEWPOINT

In 1963 the Agricultural Production Conference concluded that within the following 10 years, stock units could be expected to increase from 80 million to 110 million. These predictions were initially confirmed, as by 1970 stock units had increased by 20 million to 100.5 million. Potential was being demonstrated in

TABLE 1: LIVESTOCK NUMBERS, 1970-1980 (millions)

Year	*Dairy Cattle*	*Beef Cattle*	*Sheep*	*Stock Units*
1970	3.7	5.1	60.3	100.5
1971	3.5	5.3	58.9	100.6
1972	3.4	5.4	60.9	99.3
1973	3.4	5.7	56.7	102.5
1974	3.3	6.1	55.9	99.8
1975	3.1	6.5	55.3	99.8
1976	3.0	6.8	56.3	100.0
1977	2.9	5.8	59.1	99.9
1978	2.9	5.5	62.2	100.7
1979 (prov.)	2.9	5.2	63.5	100.5
1980 (est.)	2.9	5.1	64.6	100.7

performance. However, reference to Table 1 shows that no further increases have occurred since that time. In the early 1970s the loss in expansionary momentum was blamed on drought seasons. The report "State of the Livestock Industry" was published in 1976. It confirmed that further expansion was possible, with s.u. increases of 20 million by 1986 being suggested as feasible. Scott (1977) considered that favourable seasons could see s.u. figures rapidly increase by 10 million. But in spite of reasonably good seasons since his prediction, numbers have not increased (Table 1).

On a national basis, an alternative method for increasing export income (apart from market realizations) is an increase in animal performance. However, the figures in Table 2 show that apart from a small increase in per cow production, animal performance has varied with seasonal conditions and has not improved. It is still well below conservative estimates of potential (Hutton, 1978; Hight, 1979).

TABLE 2: PERFORMANCE PER HEAD

Year	*Lambing (%)*	*Wool/Sheep (kg)*	*Lamb Wt. (kg)*	*Milkfat/Cow at Factory (kg)*
1970	93	5.5	13.2	117
1971	94	5.5	13.2	127
1972	92	5.5	13.2	122
1973	91	5.1	12.7	118
1974	93	5.0	13.1	128
1975	94	5.3	12.9	137
1976	96	5.4	13.3	143
1977	93	5.3	12.9	131
1978	90	5.4	13.3	142
1979 (est.)	95	5.4	13.3	140

These figures should not be interpreted as indicating that incentive schemes have been ineffective. Scott and Sorrenson (1979) made an economic study of the Livestock Incentive Scheme. It showed that the 6500 programmes approved by June 30, 1978, should result in s.u. increases of 5.5 million. These programmes were estimated to cost the Government $52.8 million, but the national return on this investment would be approximately 37%. However, the s.u. increases have yet to affect national statistics. Minimum price schemes have been welcomed by farmers, but the confidence such schemes may engender will only affect national figures in the long term and may only produce conservative increases.

If land is being diverted out of animal production for reasons other than those envisaged in 1963 and 1976, then s.u. increases may be less than predicted. Scott (1977) estimated that from 1967 to 1974 this land diversion loss represented 5 million s.u. which Taylor (1979a) calculated to have increased to 9 million s.u. by 1977. These studies indicate that factors such as urban expansion, forestry and peri-urban subdivision could be removing land for use in livestock enterprises, but further critical study would be necessary to accurately estimate the extent of this loss. For example, s.u. conversion figures contribute significantly to the difference between Scott's and Taylor's estimates. In the latter study no account is taken of stock being caried on "4 ha blocks", and the loss is calculated using a stocking rate of 20 s.u./ha when the average stocking rate on intensive fattening farms in the North Island in 1977-8 was only 13.3 (N.Z.M.W.B.E.S., 1979).

Taylor (1979a) suggests that stocking rates must have increased by 12% to compensate for this loss of land. However,

TABLE 3: A COMPARISON OF DAIRY FARM PRODUCTION FIGURES IN TWO GOOD SEASONS — 1965-6 AND 1976-7

	1965-6	*1976-7*	*% Change*
Av. milkfat/cow (at factory) (kg)	138	143	+3.6
No. of herds ($\times 10^3$)	26.4	17.9	—32.2
No. of cows ($\times 10^6$)	2.1	2.1	—
Cows/herd	76	116	+52.6
Farm area (ha)	58	70	+20.7
Labour units	1.51	1.49	—1.4
Stocking rate (cows/ha)	1.31	1.66	+26.7
Cows/labour unit	50.3	77.9	+54.9
Output/labour unit (kg)	6 941	11 140	+60.5

TABLE 4: CHANGES IN DAIRY FARM STRUCTURE AND INCOME FROM 1970 TO 1977

	1970	*1971*	*1972*	*1973*[1]	*1974*	*1975*	*1976*	*1977*
Cows/herd	111	113	117	118	120	118	118	117
Milkfat/cow (kg)	120	132	127	121	132	140	146	135
Total milkfat (kg $\times$ 10^3)	13.4	14.9	14.8	14.3	15.8	16.5	17.3	15.3
Effective farm size (ha)	64	67	70	72	74	73	70	69
Labour units	1.55	1.60	1.62	1.59	1.51	1.51	1.49	1.45
Cows/ha	1.73	1.69	1.67	1.64	1.62	1.62	1.69	1.70
Milkfat/ha	209	222	211	199	214	226	247	222
Cows/labour unit	72	71	72	74	79	78	79	81
Milkfat/labour unit ($\times$ 10^3)	8.6	9.3	9.1	9.0	10.5	10.9	11.6	10.6
Gross farm income ($ $\times$ 10^3)	13.9	18.7	21.3	22.0	23.5	25.7	30.0	30.9
Net farm income ($ $\times$ 10^3)	4.8	7.5	8.5	8.2	8.6	9.6	10.5	10.2
Net/gross income (%)	35	40	40	37	37	37	35	33

[1] Revised series used 1973-77.

Source: N.Z. Dairy Board Economic Survey.

this was not the case with dairy farms (Table 4). The increase from an average of 5.4 s.u./ha on sheep farms in 1970-71 to 6.3 in 1977-8 largely occurred in one season (1974-5) and may have resulted from changes in sampling procedure or conversion units.

THE FARMER'S VIEWPOINT

When comparisons are made of productivity for sheep or dairy farms between favourable seasons in the 1960s and in the 1970s, the results suggest that national statistics do not fairly reflect improved productivity from the individual farmer's point of view. Such a comparison is made in Table 3, using figures for dairy herds obtained in 1965-6 and 1976-7. In the latter season, production per cow was only 3.6% higher, but this small increase was associated with increases of 27% in stocking rate, 53% in herd size, 58% in milkfat per farm, and 60% in milkfat per labour unit. However, reference to Table 4 will show that the stocking rate changes must have occurred before 1970. Since that time farm size and cows per labour unit have increased and labour units per farm have tended to decrease. Similar trends have occurred in the sheep industry.

The data in Tables 3 and 4 show the importance of a rarely considered factor. Whereas, on a national basis, s.u. increases will largely result from intensification of husbandry, increasing labour productivity is being achieved through increases in farm size, s.u./man and land area/man. That is, farmer objectives are being maintained by more extensive farming practices. The increasing number of rotary cowsheds in the dairy industry, and the in-place cleaning, high pressure washing (or no washing) and automatic cup removers are all innovations which will allow a dairy farmer to reduce his labour requirement or to milk more cows with present labour. The interest in "easy-care" sheep and the likelihood of sheep flocks being managed for greater wool production from dry sheep are equivalent trends in the sheep industry.

It could be argued that these labour-related changes should encourage increased stocking rates. However, most reports or surveys of farmers include farmer comment to the effect that suitable labour is increasingly difficult to find and is also becoming more expensive. This situation is exacerbated by the urban drift. Many young men who are interested in a farming career find farm wages inadequate to allow them to achieve their goal of farm ownership. Horticulture may seem an attractive alternative to these young

men, especially since this industry faces a manpower crisis (Phillips, 1979) and will have to pay attractive wages for work which is less restrictive than milking cows and less isolated than shepherding sheep.

While net income levels, taxation, death duties and levels of indebtedness have all been quoted as factors contributing to a lack of incentive to increase stocking rates, several reports have indicated that other aspects of farmer attitude must be considered. For example, Todd (1975) reported that the average age of hill-country farmers was 57 years — an age when vigorous physical exertion will usually be avoided. Maughan and Ward (1978) found that on 14 of 24 Hunterville farms, the farmer was over 50 and gave age as a reason for less interest in stocking rate increases. Kaplan (1979) concluded that the longer past age 25 that receiving responsibility for the financial management of a farm was delayed, the more the production potential of the farm would not be fulfilled. Rikys (1975) suggested that developmental or husbandry changes which result in increased output will usually occur within the first 10 years of property ownership. Thereafter what Kaplan has defined as "entry into the holding pattern" will occur.

These surveys indicate the limited value of national statistics in assessing the state of the livestock industry and highlight the need for estimates of variation to be provided with national averages. Individual farmer attitudes must be obtained through sociological studies and related to the recommendations of economists, advisers or scientists. These surveys must be analysed and interpreted before the Government considers introducing measures which may restrict farm amalgamation or relate taxation rates to farm potential.

The importance of between-farm variations in productivity and profitability was demonstrated in the study by Taylor (1979b). North Island hill-country properties were classified into two groups — high or low performance in terms of gross income per stock unit in 1976-7. The figures for income/ha for the two groups were $96 and $52, respectively, with this difference being almost entirely due to stock performance — lambing %, calving %, wool/head, and stock losses. When each group was subdivided into high (11.7 to 12.0 s.u./ha) and low (9.1 and 9.0) stocking rates, it became apparent that high stocking rate systems had higher costs/ha and were only profitable when animal performance was maintained.

THE ADVISER'S VIEWPOINT

Papers presented in recent years at this Society's conferences have shown that productivity can be significantly increased on both sheep and dairy farms through the efforts of advisers. In most cases the examples used have been particular farms or individual discussion groups. While the production increases are substantial, the proportion of farmers who benefit from having a close association with an adviser would scarcely represent 20% of property owners. Dairy farmers are better able to belong to discussion groups than sheep farmers because properties are smaller and are located in readily identifiable farming regions. Sheep farmers have the disadvantages of distance and greater between-farm variations in topography and farming systems.

However, the conflict often confronting an adviser is that aspects of advice on financial management are becoming increasingly important with a consequent reduction in effort related to the promotion of husbandry techniques to intensify farming. At the 1979 Sharemilkers' Convention, J. Simmonds showed that, from cost analyses of records for farmers in several South Taranaki discussion groups, those herd owners with highest net income/ha achieved this result by holding costs/ha while maintaining moderately good production/ha rather than by chasing high production figures without taking the same account of costs. While the attitude of the latter group of farmers was commendable from the national and possibly the adviser's viewpoint, the former group may have been of greater interest to fellow farmers.

In light of socio-economic factors influencing farmers' attitudes, the adviser can find himself in a quandary. Some aspects of technology may require greater effort from the farmer and also increase his costs. The adviser cannot necessarily guarantee that a change will be profitable even though increased production may be highly likely. In this situation the adviser may tend to become sceptical of the value and relevance of research.

Many farmers are critical of the value of an adviser's services even though some of these critics may never have used them (Maughan and Ward, 1978). Others seek information only on specific topics (soil testing, fertilizer use, pasture seed mixtures, etc.), neither expecting nor accepting advice on stock management. In this situation the potential contribution by advisers to increasing production is largely wasted.

THE SCIENTIST'S VIEWPOINT

The lack of increase in the national output of the livestock industry has been suggested by some farmers and advisers to be partly due to the limited value of research technology to farming practice. McLauchlan (1972) stated that "The research scientist in New Zealand is generally an arch-conservative who, as we become deeply committed to the 1970s, refuses to come in out of the 1950s. He is therefore in danger of becoming an anachronism." Harsh words; but a view which some would suggest is still applicable in 1980.

This type of criticism can be readily countered. Two conference papers serve as examples. Wickham *et al.* (1977) reported that the genetic improvement attributable to the New Zealand Dairy Board's artificial breeding service, since its inception, has resulted in at least an extra 70 100 tonnes of milkfat by 1975, giving an accumulated value of $19 million at 1974-5 prices. This value will have increased substantially since that time, first because of increased prices obtained for milkfat, and secondly because of increasing numbers of AB progeny. This insemination service is industry-organized, it funds most of its own related research, and has recently had the soundness of its selection procedures substantially justified in a trial in Poland. More importantly, from the user's viewpoint, the higher production levels of AB stock compared with naturally bred herd mates make the costs of using AB fully justified. Scientists can reasonably ask, "Why are only 45% of New Zealand dairy cows artificially inseminated, and why is the service used by only 60% of herd owners?"

The second paper, published by Campbell *et al.* (1977), summarized the performance figures obtained from AB Jersey cows at the Ruakura No. 2 Dairy and compared them with figures obtained by the mythical "average South Auckland dairy farm". In this case, the effective use of recommended management procedures with genetically superior stock at the No. 2 Dairy produced production levels which were 29% higher per animal and 100% higher per hectare. The publication of the paper aroused a response which produced correspondence of an esoteric nature tending to confuse rather than clarify the most important result: namely, to demonstrate the increases in production potentially obtainable. If a comment were to be made of the relevance of the No. 2 Dairy study to farming practice it would be that most farmers either cannot recruit suitable labour or are not interested in increasing labour from 1.6 to 3.1 units per farm.

This attitude towards the use of labour may be a very important reason why many aspects of technology are not readily applied by most farmers. Many time-saving or labour-saving techniques, some of which I have previously mentioned, are rapidly adopted by farmers, and especially by dairy farmers. But this will be at least partly because their use will facilitate moves to a more extensive farming operation (less labour, more land, more stock per labour unit). By contrast, a substantial amount of research is directed towards intensification (higher stocking rates, more measurements of individual animal performance, etc.). Some technology developed in Australia or New Zealand has found little use in these countries but is widely used overseas. For example, the synchronization of oestrus and the artificial insemination of sheep was developed in Australia but is now most widely used in France and Ireland where product prices are higher and more intensive husbandry is profitable. This same reason may mean that the Irish dairy farmers can use New Zealand dairy farming technology more readily than this country's farmers.

The scientist's frustration is that, knowing the effect which his research has on potential output, he sees his results put to little use. Is it possible that the farmers' or advisers' comments on research relevance arise because the different parties are not fully aware of each other's objectives? If this vacuum exists, then that area of scientific endeavour referred to as "applied research" could play an important role. That is, many scientists and advisers regard the role of applied or "on-farm" research as a rather scientifically unsophisticated medium for proving that research station results can be obtained under field conditions. Once field tested, the technology should be accepted and advocated by advisers and adopted by farmers.

Applied research may be even more effective in defining the true nature and significance of husbandry problems as they occur in the field. These problems can then become the subject of intensive research effort after factors which influence between-herd or between-flock variation have been identified. Examples of this type of work include sheep reproductive wastage studies in South Island flocks, the use and effectiveness of magnesium supplementation during winter/spring months in dairy cows, the importance (or unimportance) of short return intervals on conception patterns in dairy herds, etc. A most important point about these examples of applied research is that the scientist is obliged to leave his "castle" and to work closely with advisers and participating

farmers. The contribution of such farmers to the advancement and application of research technology represents a largely untapped resource. From the scientist's point of view it may seem an ill-defined area of research rarely suited to his specialized training and often requiring the enlightened assistance of a patient biometrician. However, if an applied research programme has been successful, the results are usually readily explainable to advisers and farmers partly because the listeners can recognize the problem and the relevance of the recommendations. One aspect of modern research administration which can militate against the greater development of applied research programmes is that scientists are concentrated in relatively large numbers at only a few research stations. Under these conditions they tend to specialize on one aspect of research and generate work for each other until their time is fully occupied by on-station commitments.

GENERAL CONCLUSIONS

This address has endeavoured to highlight some of the interactions occurring between different groups involved in the livestock industry. Each group is certain of its potential capabilities or contribution to increased output by the industry, *provided the right conditions exist for this potential to be demonstrated.* Yet, when this potential for increase is not occurring, each group readily finds fault with the role or value of other groups, giving little consideration to the possibility that aspects of its own attitude may also be contributing to the stagnation. If one group's viewpoint deserves greater consideration than others' it is the farmers' viewpoint. While economists, accountants and some farmers may consider that financial factors such as prices received, prices paid, taxation, indebtedness, etc., are the most important, sociological factors such as farmer age, labour recruitment and the drift to less intensive farming are more likely to reduce the effectiveness of incentives or subsidies. Under these circumstances national stock numbers are unlikely to decline, but it is also probable that any increases which do occur will be modest increases.

If this conclusion indicates a pessimistic attitude, it also confirms the contention that Longfellow's quotation is most applicable to New Zealand's livestock production industry. The resolution of the problem will be most likely if it is examined and discussed by people from different groups presenting different viewpoints. Failure to resolve the problem will probably mean that the livestock industry will receive less support in terms of incentives

and finance for advisory services and animal production research. This loss in potential production in the livestock industry is certainly a matter of national concern.

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