

REGIONAL ANIMAL HEALTH AND PRODUCTION MANAGEMENT PROGRAMS

INTRODUCTION

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In the management of any livestock production systems, a high priority has to be given to the prevention, control or eradication of disease to ensure that the system will function efficiently. Government organisations in Australia, with industry support, have played a leading role in disease eradication through national animal health programs. The Brucellosis and Tuberculosis Eradication Campaign has been the most recent national program, and many areas are now free of these diseases. Freedom from these and many other diseases is a distinct advantage in securing access to world markets for Australia's livestock products.

Apart from eradicating disease, an additional outcome from these national programs has been an improvement in livestock and production management. This has encouraged scientists and animal health advisors to seek further opportunities to increase the efficiency of Australia's livestock industries by the provision of animal health and production management services on a regional basis.

Four examples of such services are reviewed in this contract. The first examines opportunities to improve the cattle industry in northern Australia. This is followed by a review of the regulatory control of footrot of sheep in Victoria, and of the economic benefits which have flowed from it. Thirdly, a regional program to control internal parasites of sheep is reviewed to highlight the essential integration of research and extension to implement the program, and the importance of 'after-sales service' to ensure that it is successful. Finally, the opportunities for these programs to be provided to individual farms are reviewed,

It is important to emphasise in the beginning that these programs required many skilled people for the multi-disciplinary teams that are needed to deliver the services',

ANIMAL HEALTH AND PRODUCTION IN THE NORTHERN TERRITORY

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The Australian beef industry has undergone dramatic changes over the past decade. Nowhere have these changes been more evident than in the extensive cattle herds of northern Australia. A number of factors have impacted on the industry, including the Brucellosis and Tuberculosis Campaign (BTEC), increasing costs of labour and fuel, high interest rates, changing market trends, instability of beef prices and uncertainty about access to overseas markets.

Undoubtedly, the most critical factor in stimulating change in the Northern Territory has been BTEC, which is now in its concluding stages. The extra controls, capital improvements and changes in management techniques which have been a necessary part of this campaign now provide opportunities to increase production and profits through better pastoral management and herd health programs. Both

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governments and industry have recognized the benefits to be gained from these programs, but their delivery is still some time away.

MANAGEMENT PROGRAMS TO INCREASE PRODUCTION

In the Northern Territory, the areas in which the most progress can be made towards improving the efficiency of beef production are in decreasing operational costs, reducing mortalities, and herd re-structuring. However, there is a number of constraints. The most important of these is undernutrition, which has been the major obstacle in the past and will continue to be so in the future. Other important constraints are the variation in the level of management and the difficulty in controlling livestock on extensive holdings.

Nevertheless, some of the management techniques used in the more intensive cattle raising areas of southern Australia could be adapted to and benefit the industry in the Northern Territory.

Bull soundness evaluation techniques have a place in the Northern Territory, and could result in a reduction in bull percentages. As an example, on one Northern Territory property in 1987, 14 percent of herd bulls were culled, primarily for abnormalities of the testicles and deviations of the penis, from a herd of 193 Herefords presented for a serving capacity test (Bertram and Carpenter 1987 unpub.) As a further aid to evaluation, McCool (1986 unpub.) has developed a table of acceptable scrotal circumferences for various ages of Brahman and Buffalo bulls. Selection for libido will probably take longer to be accepted than will soundness evaluation, and its application to *Bos indicus* breeds has yet to be proven.

Genetic selection offers a means whereby many properties could select and breed their own bulls. The larger breeder herds have a broad genetic variation providing an excellent base for improving production through objective selection of sires.

Breeder cow management programs are needed urgently. Factors contributing to mortality in breeders must be defined, and strategies such as early weaning and supplementation need to be investigated and evaluated in economic terms.

Heifer management programs are currently being evaluated for various regions. Age at weaning, mating liveweight, mating time and supplementation are all being examined in an attempt to reduce mortalities in lactating heifers.

Controlled mating has application in areas where the season is reliable and access to bulls can be controlled. However, it is unlikely that many properties will be able to implement such a program.

Pregnancy diagnosis has not been used to any great extent in the past. In the better cattle country in the south of the Territory this situation will probably continue as culling cows on their lactation status and body condition will prove adequate. However, if viable management programs for breeder cows can be developed, then pregnancy diagnosis will have an important role to play in the nutritional management of herds in the north.

Provision of supplementary feed, in the form of grain or forage/is not practical in the Northern Territory, other than sometimes for survival. Early weaning, where it can be implemented, is still the best method of improving the nutritional management of breeder cows. However, the practice 'of providing' mineral and protein supplements is being accepted gradually, and wet season supplementation with phosphorus is finally being adopted.'

Health programs entailing treatment for internal parasites may be justified in some areas, particularly in the sub-coastal plains of the far north where haemonchosis has been diagnosed. Also, there may be a role for advice on control of ectoparasites and vaccination against bacterial diseases,

Economic implications of management decisions are difficult to predict. However, recent emphasis on development of computer simulation models by the Australian Meat and Livestock Research and Development Corporation (AMLRDC) and others should open the way for more accurate assessments of the economic implications of different management decisions. These assessments will have an important bearing on the development and acceptance of management programs in the cattle industry of the Northern Territory.

LEGISLATIVE DISEASE CONTROL - FOOTROT AS A MODEL

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Footrot, a contagious disease caused by virulent strains of the bacterium, *Bacteroides nodosus*, is of major economic significance to the Australian sheep industry.

Throughout Victoria, the Stock Disease Act 1968 prohibits the exposure of infected sheep in saleyards, prohibits the sale of infected sheep except directly for slaughter, and requires owners to inspect their sheep regularly and treat any infected sheep.

In addition to these legislative requirements, a "Footrot Control Area" (FCA) was established in 1969; within this area measures to control the disease are required by law.

FOOTROT CONTROL AREA

The Footrot Control Area in Western Victoria covers 6 million ha, and contains 5,200 sheep flocks and 6.0 million sheep.

Within the FCA there is provision to quarantine infected flocks and to publish the names of owners of quarantined flocks. The Minister also has the power to order sheep to be sold: Owners must notify an inspector if they suspect footrot infection.

Inspectors provide advice on footrot diagnosis, methods of footrot control and eradication. Sheep sales in the FCA are inspected. Sheep suspected of being infected may not be sold to another sheep owner.

To reduce the risk of introducing infection into uninfected flocks, infected flocks are placed under strict quarantine. This quarantine remains in force until footrot is eradicated. To be sure eradication has been achieved, flocks are held in quarantine until they have passed through a period conducive to the spread of footrot without the disease occurring in the flock.

Surveys by the Victorian Department of Agriculture and Rural Affairs within the FCA show that few, if any, infected flocks are not under quarantine, and the number of flocks under quarantine at any time can be used to reflect the prevalence of footrot within the FCA. Since 1969 the percentage of flocks under

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quarantine has decreased from 10% to 0.25% in 1986.

The aim of the legislative disease control programme in the FCA was to control footrot to the net economic benefit of the community, but it was never believed that eradication of footrot from the FCA was possible.

ECONOMIC BENEFITS

Historical appraisal of the economic merit of the FCA for the period 1969 to 1981, using 10% real rate of discount, indicates that the legislative program has produced a net social benefit of \$9 million (Stott 1986).

If a 'real' discount rate of 5% is used the net social benefits are increased to approximately \$12 million. In the same paper, Stott (1986) (using a 10% discount rate) considers that the cost/benefit ratio of retaining the FCA compared with its discontinuance is 1:48. This forecast cost/benefit ratio is greater than the ratio for the first 13 years of FCA, because it is cheaper to maintain a low prevalence of footrot following the great reductions in prevalence of infected flocks.

FOOTROT CONTROL OUTSIDE THE FOOTROT CONTROL AREA

Outside the FCA, efforts to control footrot depend largely on individual owner co-operation. In October 1981, a survey was conducted by the Department of Agriculture and Rural Affairs to determine the prevalence of footrot in areas adjoining the FCA. Flocks, with more than 200 sheep, were selected at random, visited and a number of sheep from each mob in the flock was examined for footrot. This survey showed a prevalence of 7% in areas where annual rainfall was less than 500 mm, and 10% in areas with higher rainfall.

Prior to August 1986 the legislative powers with respect to footrot outside the FCA were limited. Whilst it was an offence to expose infected sheep in a saleyard, the notification of infection in a flock was not compulsory and no powers existed to quarantine infected flocks.

Officers inspect sheep at saleyards for the presence of footrot and lice. In the Benalla district during 1984, for example, 21 lots of store sheep at local saleyards were found to 'have virulent footrot'. It is estimated this detection plus the additional deterrent effect of saleyard inspection potentially saved 39 properties from becoming infected with footrot. The cost of this inspection program in the Benalla district in 1984 was estimated to be \$8,500 - a cheap price' for saving 39 flocks from footrot.

Key factors in the success of footrot control are community support together with appropriate legislation. Legislation is necessary to enable positive action to be taken if an individual fails to control footrot and hence poses a risk 'to neighbouring flocks.

In a study of 144 flocks infected with footrot in the Warrnambool district outside the FCA, Fitzpatrick (1985) 'showed that of those 71 owners that actively sought Departmental advice on the eradication of footrot, 79% eradicated the disease within 2 years. Whereas of those with footrot detected by the Department, for example through saleyard inspection, only 48% achieved eradication.

Owners who 'want to eradicate footrot usually succeed, whereas those who are equivocal about footrot or do not believe eradication is possible invariably fail to control and eradicate the disease. This latter group continue to act as a source of infection for others, hence the need for legislation to ensure that the

community is not disadvantaged by the few who fail to meet their responsibilities.

VOLUNTARY DISEASE CONTROL - THE 'WORMKILL' PROGRAM

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Farmers in northern New South Wales have relied on frequent treatment with broad-spectrum anthelmintics to control worm parasites of sheep, particularly *Haemonchus contortus*. It was common practice to drench lambs at least every four weeks and ewes at least every eight weeks during the spring, summer and autumn months; on average, lambs were treated eight times and ewes seven times per year (Newman 1984). As a consequence, resistance to the benzimidazole and levamisole/morantel groups of broad-spectrum anthelmintics has become widespread in field populations of other major worm parasites, such as *Trichostrongylus* (Wailer 1985).

One of the few options available to farmers to delay the further development of resistance is to reduce their drenching frequency. The WORMKILL program was developed with this in mind. The program was designed to control *H. contortus* by strategic treatments with a narrow-spectrum anthelmintic, closantel, so that the frequency of treatment with broad-spectrum anthelmintics could be reduced, thereby reducing selection for resistance in *Trichostrongylus* (Dash 1986).

COMMUNICATION METHODS

WORMKILL was introduced into the Northern Tablelands of New South Wales in July 1984. The program was later extended to the Northern Slopes and Upper Hunter regions of the State and now operates in eight Pastures Protection Board districts with a total sheep population of about 10 million.

Because the program involved a drastic reduction in drenching frequency, it was expected that farmers would be cautious in adopting it. For this reason, the introduction of the program was accompanied by an intensive education campaign, using radio, television, local newspapers, farm magazines and mailed brochures. Particular emphasis was placed on direct, personal contact with farmers at meetings and field days to explain the principles of the program and how these could be applied in different farming situations. The same methods have been used to reinforce the original message and to review the performance of the program in the three years since it was introduced.

The message conveyed to farmers is that WORMKILL is a continuing advisory program. Its aim is not to maximise animal production in the short term, but to maintain high levels of production and 'drench efficiency' in the long term.

ACCEPTANCE

Surveys have indicated that about 75% of sheep farmers in the Northern Tablelands adopted the WORMKILL program or variants of it in 1984/85, and about 90% in 1985/86 (Table 1). The first survey (Newman 1984) was conducted by personal interview. The second, by the Department of Agriculture, was based on replies to a questionnaire mailed to every sheep farmer in the Northern Tablelands; the 392 replies were from farms with an average flock size of 3540, accounting for 25% of the region's sheep population.

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Table 1 Surveys of adoption of the WORMKILL program

Source	Year	Sample size	District	%adoption*	
				1984/85	1985/86
Newman (1984)	1984	27	Armidale	74-85	
Department of Agriculture	1985	392	Northern Tablelands	77-81	91-94

*The lower figure is for farms where all sheep were treated according to the program; the higher figure farms where only trial groups were treated

As predicted by Newman (1984) and confirmed in the Department of Agriculture survey, some farmers adopting the WORMKILL program added one and sometimes two treatments with broad-spectrum anthelmintics, particularly for young sheep. In 1984/85, an average of 1.1 added treatments were given to lambs or weaners on 45% of farms, and to ewes, hoggets and wethers on 15%, 12% and 6% of farms respectively. In 40% of cases these were given as a precaution or as a treatment against tapeworms or liver fluke, not because of any perceived problem with roundworm control.

Assuming an adoption rate of 75% in 1984/85 and 90% in 1985/86, and allowing for these added drenches, it is estimated that the number of individual sheep treatments with broad-spectrum anthelmintics was reduced by 47% in the first year and 56% in the second when compared with 'traditional' practice. In the Northern Tablelands, which carries 60% of the sheep population in the WORMKILL target area, this represented a direct cost saving to farmers of \$3.96 million over the two year period.

"AFTER-SALES-SERVICE"

Based on observation and routine monitoring of faecal worm egg counts of sheep immediately prior to scheduled WORMKILL treatments on 15-25 designated farms in the Northern Tablelands, arithmetic mean worm egg counts of 500 eggs per gram or less are regarded as 'acceptable'. Management practices and anthelmintic efficacy are investigated when egg counts consistently exceed this level.

Problems reported to and investigated by advisory officers have usually been found to be associated with anthelmintic resistance in *Trichostrongylus* and/or *Ostertagia* spp. On 46 of 49 'problem' farms investigated in the first two years of the program, the efficacy of one or both groups of broad-spectrum anthelmintics was less than 80% as determined by faecal egg count reduction tests. Resolution of these problems has been relatively simple where resistance was confined to one anthelmintic group, but in cases of multiple resistance it has involved using increased dose rates or an alternative anthelmintic such as naphthalophos, and changing management practices. In all instances the aim has been to re-establish effective worm control without increasing the frequency of treatment with broad-spectrum anthelmintics.

This 'after-sales-service' is regarded as a major factor in maintaining farmers' confidence in the WORMKILL program.

ANIMAL HEALTH AND PRODUCTION MANAGEMENT SERVICES ON INDIVIDUAL PROPERTIES IN SOUTH-EASTERN AUSTRALIA

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Results from some 1000 respondents to 5 surveys conducted by the University of Melbourne of sheep and beef properties in Victoria, NSW, and South Australia disclosed poor levels of adoption and implementation of practices which have apparently proved valuable to farmers and the livestock industries. This indicates that some of the information available was not reaching or not being adopted by farmers. Substantial changes in the systems of information transfer and use seems necessary if the penalties of poor adoption of technology in animal health and production were to be avoided.

Farmers obtain information on animal health and production from many sources, but information from several expert sources may well be conflicting. Farmers find it difficult to interpret the information or its relevance for their production systems. Hence, personal advice, discussion, demonstration, and tutoring are essential if the farmer is to assimilate and use this information to solve problems or improve the profitability of his enterprise.

A high level of training, and motivation, are essential before persons are able to analyse farm production systems. The specialist training needed has not generally been available for veterinarians. A bequest provided the opportunity, and some of the resources, to initiate a program to train veterinarians in the necessary skills. This program included formal studies of economics, farm systems management, nutrition and management of grazing animals, genetics, reproduction, and disease diagnosis and control in the pastoral industries. Relevance to the pastoral industries was also assured by the provision of an animal health and production management service to sheep and beef cattle properties on a fee-for-service basis. Known as the Mackinnon Project at the University of Melbourne Veterinary School, the service uses diagnostic techniques including faecal egg counts, cash flow analysis, feed budgeting, etc., in a whole farm systems approach to identify problems limiting animal health, production and farm profitability. Measures recommended to overcome these limitations are monitored (Grant et al. 1987).

OPPORTUNITIES

Replies from the surveys, and experience with the University of Melbourne consultancy service to 115 farmers over the past 5 years, indicated that there were opportunities for improvement in productivity, through better animal health control and production management, on individual farms in at least 21 areas (Morley 1985). Obvious challenges include internal parasite and ectoparasite control, footrot control and eradication, clostridial vaccination, supplementary feeding, mineral nutrition, stocking rates, pasture improvement, and organisation of the management calendar, particularly in relation to lambing times, weaning and shearing, reproductive* performance and genetic improvement.

ADVANTAGES OF AN INDIVIDUAL PROPERTY APPROACH - SOME EXAMPLES

Application of new technology is usually difficult on many farms. Extension services cannot justify the necessary attention to individual, farmers to ensure a high adoption rate and level of application for many animal health and production management practices. Changes often generate new problems, and expose further limitations. Monitoring the effects of recommended changes is necessary. They must be appropriate, effective, and profitable for a farm. This is difficult for

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the farmer to do alone. Regional recommendations must usually be made for average farms, and years. Farmers may not understand them. Further, it is no criticism of either farmers, or their advisers, that the financial implications for the consequences of technical recommendations may be insufficiently explored.

Worm control in sheep in south eastern Australia, requires a whole farm approach. Thus, for example, internal parasites may not be apparent at a low stocking rate, but a higher stocking rate could raise pasture contamination. A change in flock structure, or time of lambing may also have implications for worm control. Worm problems must be prevented rather than treated. Effective control may be almost impossible once paddocks are heavily contaminated. Planning paddocks for high risk animals, such as young stock, is difficult and is best done on an individual property basis. Monitoring of faecal egg counts and worm burdens is basic for effective control.

Time of lambing has important implications for farm productivity. Our surveys indicate that 90% of Merino flocks in North/Central Victoria, and 85% of flocks in the Western District of Victoria lamb in the autumn. A change from an autumn to a spring lambing could be worthwhile (McLaughlin 1968), but the time of shearing may need to be altered, and other changes implemented. Weaner management, mineral nutrition, foot abscess, stock sales and cash flow may become more important. Further, stock numbers may need to be increased, and flock structure changed. An appreciation of the whole farm system is required if any change in management strategy is to be successfully implemented.

FARMER ATTITUDE - THE KEY TO SUCCESS

Many of the recommendations for improved animal health and production involve a change of attitude by the farmer, and therefore the one-to-one approach is essential. The individual who is marketing the service must establish a relationship as well as a rapport with the farmer. At a one-to-one meeting, matters of individual concern can be discussed, and doubts resolved. Communication skills with farmers and a range of specialists, and a broad knowledge of the agricultural industries, are required by the person providing the individual property advice. More importantly, specialist knowledge of animal health and production is essential.

A whole farm approach enables advice to be tailored to the farm and the farmer. Since any advice on the effects of changing animal health and production management is made with an accompanying budget, the farmer who is paying for the service may more closely follow the recommendations if he can appreciate the benefits that may be realised.

CONCLUSIONS

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Regional animal health and production programs can be successful and rewarding, as shown by the examples in this contract. The key ingredients for success are:

- Programs must be soundly based and should be packaged and marketed in a form which is applicable, practical, cost-effective and 'acceptable to the specific production system and producer.

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- . Programs should be flexible. They require constant monitoring and should be modified in the light of experience or in anticipation of changing circumstances.
- . Programs should start small and concentrate on specific perceived needs.
- . People "make or break" programs. A leader with vision and the ability to recognize and integrate the skills of enthusiastic and credible team members is essential.
- . Legislative support is essential for those programs which require total producer compliance.

Scientists and farm advisors who wish to take advantage of the opportunities offered by regional animal health and production programs need to improve their understanding of the broader issues impacting on agriculture. Their technical expertise, public speaking and inter-personal skills need to be of a high standard. Above all, they must be prepared to work as part of a multi-disciplinary team.

REFERENCES

- DASH, K.M. (1986). Aust. Vet. J. 63: 4.
- FITZPATRICK, D.F. (1985). Proc. 4th Int. Symposium on Vet. Epidemiology and Economics p.332.
- GRANT, I. McL., WATTS, T.J., ALLWORTH, M.B., MORLEY, F.H.W. and CAPLE, I.W. (1987). Aust. Adv. Vet. Sci. p.84.
- McLAUGHLIN, J.W. (1968). Proc. Aust. Soc. Anim. Prod. 7: 223.
- MORLEY, F.H.W. (1985). Aust. Vet. J. Proc. Conf. on Vet. Prev. Med. and Anim. Prod. p.25.
- NEWMAN, R.L. (1984). "Worm Control in Sheep on the Northern Tablelands of N.S.W.: A Survey of Farmers' Opinions". (Department of Agricultural Economics and Business Management: University of New England.)
- STOTT, K.J. (1986). Footrot in Ruminants. Proc. of a Workshop, CSIRO Australia 1986, p.27.
- WALLER, P.J. (1985). In "Resistance in Nematodes to Anthelmintic Drugs", p.1, editors N. Anderson and P.J.Waller. (CSIRO Australia and Australian Wool Corporation: Sydney).