Planned Animal Health and Production Service (PAHAPS) in New Zealand Dairy Herds

K. Moller, *DRVAC (Copenhagen), MACVSc.*
Department of Veterinary Clinical Sciences
Massey University
Palmerston North, New Zealand

New Zealand dairy farming is a low cost grassland operation. It is based primarily on a seasonal system of management whereby the calving pattern of the herd is concentrated so that maximum milk production coincides with the greatest pasture production for grazing. While techniques for planned animal health and production systems had been developed in other countries, modifications were likely to be required if they were to be applied to this production system. A feasibility study was carried out on a group of 18 Waikato seasonal supply dairy farms; the results of this study are presented in this paper.

Selection of Farms

Two comparable groups of farms were established by late 1972–one receiving an intensive form of PAHAPS from a veterinary consultant, the other not. Their productivity and economy were compared before and after the investigation.

Initially 20 like pairs of farms were selected from a pool of 100. The criteria for pairing were similarity in per-hectare production, soil type, stage of development and location. One of each pair, chosen at random, was invited to co-operate closely with the veterinary consultant and farm adviser and was designated as an experimental farm. The other was requested to supply information about production levels and economy and was designated as a control farm. Eighteen experimental and 15 control farms finally entered the programme. Three of the latter acted as controls for two experimental farms each.

Methods and Results

The interest focussed on four areas: pasture management, feeding efficiency, breeding efficiency and disease control. The aim was to diagnose inefficiency and remedy it in a practical way. A four- to six-month fact-finding period allowed the consultant to get to know each farmer and his aims, and the nature and dimension of the problems facing him. Frequent farm walks allowed assessment of pasture management and nutrition of stock. Analysis of calving/mating data was used to assess breeding efficiency, and perusal of records of diseases, California mastitis testing and facial eczema spore counting were used to determine the efficiency of disease control. No advice or long-term planning was advanced until the end of the familiarisation period, when a lengthy report (or prospectus) was sent to each farmer, his farm advisor and veterinary practitioner. A number of propositions for remedial action were put up, and each farmer was asked to choose between them and to reject or accept each proposal. Care was taken to make them suit the circumstances on each farm. Cost/benefit analysis was applied to each proposition, if at all possible. If the farmers had not already tried their hand at implementing proposed techniques (for example, weighing of stock) the proposals were discussed at length with them. This put them in a strong position to choose sensibly.

The three-year experimental period began when the herds were dried off in March/April 1973. A comprehensive monitoring system was applied–this sought to predict pending problems and measured progress towards the targets set during the planning stage.

Pasture management received attention at each farm visit and in almost all reports. Efficient management is particularly critical during the winter months with minimal growth, and during the peak growth period in spring and early summer. Advice regarding fertiliser programmes, weed and insect control and pasture renewal was largely the responsibility of the farm advisor, but the veterinary consultant was very much involved with questions of grazing management and stocking rates. Feed budgeting was attempted during winter, but was generally not applied in its classical form (Hutton and Bryant, 1976), and farmers used the principles in their own way. Although improvement in this area is very hard to quantify, it was generally agreed by independent observers that improvements did occur during the experimental period.

Feeding efficiency was assessed and monitored by observation of stock (condition scoring–Moller, 1978), by weighing, by analysis of production levels and by measuring the level of anestrus. Minimum target weights ensuring reasonable reproductive performance and milk yields were established and used (see Table 1).

Production graphs depicting the daily output per hectare indicated inadequacy of feeding when a plateauing or drop in output had occurred during the first two months after calving. Atypical drops at other times of the production seasons not mimicked in control herds, lead to similar conclusions. The information about production levels was received every ten days and became a monitor of feeding efficiency or an

Table 1

Bodyweight and Daily Growth Rate Targets

Age in days	Bodyweight targets (kg) for dairy replacements 0 (birth)	60 (weaning)	420 (mating)	715 (calving)
Jersey	25	50	190	300
Friesian-Jersey	29	58	205	350
Friesian	32	65	220	390

	Required daily growth rates (kg) for dairy replacements From birth to weaning	From weaning to mating	From mating to calving
Jersey	0.42	0.39	0.37
Friesian-Jersey	0.48	0.41	0.50
Friesian	0.55	0.43	0.54

	Bodyweight targets (kg) for adult cows At drying off	Before calving	After calving
Jersey	325-345	360-390	325-345
Friesian-Jersey	350-370	390-410	350-370
Friesian	370-400	420-450	370-400

indication of possible disease in the herd.

The level of anestrus was assessed after rectal examination of cows which had not been seen in estrus. Two examinations were arranged, one by the start of mating and another 28 days after the start. At the first only cows wich had been calved for at least 42 days were examined; at the second, all cows not yet mated. High levels of established anestrus were taken as an indication of inadequacy of feeding before calving.

Improvements in condition, the reaching and exceeding of target weights in both young stock and dry cows, improvement in the shape of production graphs, increased production levels and a reduction in the number of anestrous cows, all suggested that feeding efficiency had improved during this experiment.

Breeding efficiency was assessed by analysis of calving/mating records, and monitored at a visit 28 days into mating, and when required also 36 and 49 days after the start of mating.

The concept of submission rate was introduced because it has particular importance in seasonal farming. It is defined as the percentage of a herd mated within the first 28 days after the start of the breeding season. Submission rate influences the spread of calving the following year and also the median calving date. It, in turn, is influenced by the level of anestrus, and the owner's capabilities of heat detection. Analysis of existing records suggested that it is feasible to obtain a 92% submission rate on commercial dairy farms.

An analysis of submission rate results of the Waikato trial are shown in Table 2. Highly significant differences were obtained between the two groups. The results demonstrate that once high SR levels are achieved further improvements are difficult and the input of labour and capital required to obtain these in such herds is likely to be more profitably placed elsewhere.

The initial improvement in SR in group (2) herds was similar for two-year-old and older cows and was probably brought about by an overall improvement in nutrition. Further improvement in the two-year-old cows coincided with the introduction of the technique of calving this group 14-16 days earlier than the older cows of the herd. Where such a procedure is carried out efficient feeding and disease control from calfhood is essential.

Table 2

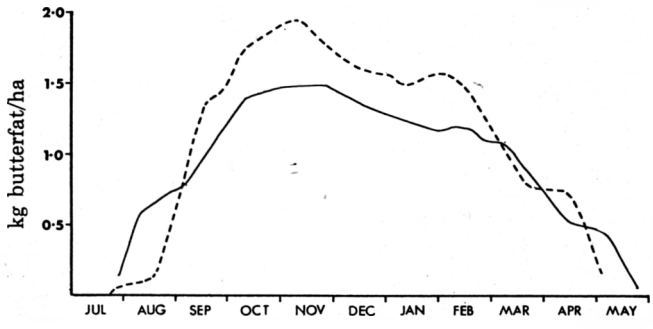
28-Day Submission Rate (SR) in 18 Experimental Herds

		1972	1973	1974	1975
1. 7 High SR Herds	2 year olds	95.7	92.8	95.8	95.1
	Older cows	96.0	95.3	93.0	94.4
2. 11 Low SR Herds	2 year olds	79.9	86.2	89.5	90.4
	Older cows	85.5	91.4	91.6	88.8

The contribution of breeding efficiency to improved productivity is thought to have been an effect of better timing of calving relative to feed supply (see Figure 1) and fewer later calving cows. The narrowing of the calving spread while not spectacular did ease management problems.

Disease control was concerned with conditions which tend to affect a number of animals in the herd and reduce production. Mastitis control depended on identification of affected quarters, by using the California Mastitis Test, and selective treatment of them at drying-off. Milking machine efficiency was checked yearly and faults were corrected. The milking technique was investigated and altered when this was required and a high standard of hygiene was fostered. Teat spraying was employed and culling of persistent CMT reactors and clinical cases was promoted. Results of CMT are shown in Table 3; the level of clinical mastitis dropped during the experiment (Table 4).

Facial eczema was controlled by the spraying of pasture with fungicides. Attempts were made to predict outbreaks by spore counting of pasture, and this procedure was carried out by the farmers



____ = Production year A (kg butterfat per hectare 254). Median calving date 1 August.
- - - = Production year B (kg butterfat per hectare 320). Median calving date 15 August.*

Figure 1. Correlation between calving time and production on a farm. *Moller, 1978

Table 3
Positive CMT Reactivity in 19 Herds 1973/76

Means of Herds	Jan 73	Mar/ Apr 73	Oct 73	Jan 74	Oct 74	Mar/ Apr 75	Oct 75	Apr 76
% Quarters	21.1	26.0	7.1	10.0	4.1	6.3	3.4	16.5*
% Cows	47.3	50.2	19.7	25.5	12.9	17.3	10.5	31.5*

*High levels thought due to lateness of tests rather than increased mastitis. Under New Zealand seasonal farming conditions all cows are dried off at the same time of the year, usually April/May.

themselves under supervision. An area of land just sufficient to provide initial protection was sprayed as danger approached, and further spraying would depend on further daily spore counting. This disease was kept at bay where this plan was closely followed. Cost/benefit analysis indicated that the cost of purchasing the microscope and the haemocytometer slide necessary for spore counting would be recouped very quickly on those farms where spraying was thought necessary.

Bloat was controlled by drenching each cow daily during milking or by spraying pasture with antifomintics. Less efficient control was achieved by flank treatment or water trough medication.

Hypomagnesaemia was diagnosed by the blood sampling of 10% of the herd and predicted by chemical analysis of grass samples. Treatment and prevention was by supplementation with calcined magnesite dusted on grass or fed on hay or with magnesium sulphate added to drinking water. Selenium and copper deficiency was diagnosed by blood sampling and pasture chemistry, and treated by supplementation.

Diseases of young stock, principally enteritis in very young calves and helminthiasis in older calves, were controlled by proper attention to hygienic calf rearing and efficient grazing regimes, supported by medication. The "spread grazing regime" was widely used (Moller, 1978). Calves were vaccinated against leptospirosis and blackleg/malignant oedema as circumstances demanded it.

An aim during the investigation was to reduce compulsory wastage due to infertility, mastitis and death and thus allow heavier culling due to inherited characteristics such as low production and temperament. It was hoped that a reduction of "compulsory culling" would eventually permit the rearing of fewer replacements and increase overall productivity. The experimental period was not long enough to permit the realisaton of these goals and little reduction in herd wastage was actually achieved (Table 5).

Production levels increased during the experiment (Table 6); these increases were thought to be a result of the total impact of the PAHAPS programme.

Table 4
No. Quarters Treated for Clinical Mastitis (% Total Quarters) in 16 Herds

	1972/73	1973/74	1974/75	1975/76
No. quarters	*1665	1079	804	796
% Quarters	*13.8	8.6	7.1	7.0

*Partly estimated.

Economic evaluation indicated increased earnings during the last year of the project (Table 7). Little change was anticipated in the first year because of the delay which follows a change in management and the observation of its effect. While a difference was noted in the second year in favour of the experimental group this was not statistically significant because of the variability in response between herds. Net financial returns and production levels followed similar trends.

Experimental farms had increased expenditure on animal health from 1973 to 1975 (Table 8).

Summary and Conclusion

A practical project involving a planned herd health and production service resulted in highly significant production increases and in improved returns on 18 dairy farms under seasonal, low cost farming conditions typical of dairying areas of New Zealand. The

Table 5
Herd Wastage 1972-76 15 Herds

	No. cows culled (% of total cows)			
Season/Cause	1972-73	1973-74	1974-75	1975-76
Low production	190 (6.9%)	138 (4.8%)	165 (5.8%)	245 (8.3%)
Infertility	166 (6.0%)	200 (7.0%)	177 (6.2%)	154 (5.2%)
Mastitis	120 (4.4%)	122 (4.3%)	73 (2.5%)	69 (2.3%)
Temperamental, difficult to milk	32 (1.2%)	26 (0.9%)	19 (0.7%)	22 (0.7%)
Miscellaneous	83 (3.0%)	96 (3.4%)	69 (2.4%)	64 (2.2%)
Deaths	31 (1.1%)	30 (1.1%)	50 (1.7%)	51 (1.7%)
Total	622 (22.6%)	612 (21.5%)	553 (19.5%)	605 (20.0%)
Compulsory culling (brucellosis eradication)	19 (0.7%)	78 (2.7%)	63 (2.2%)	4 (0.1%)

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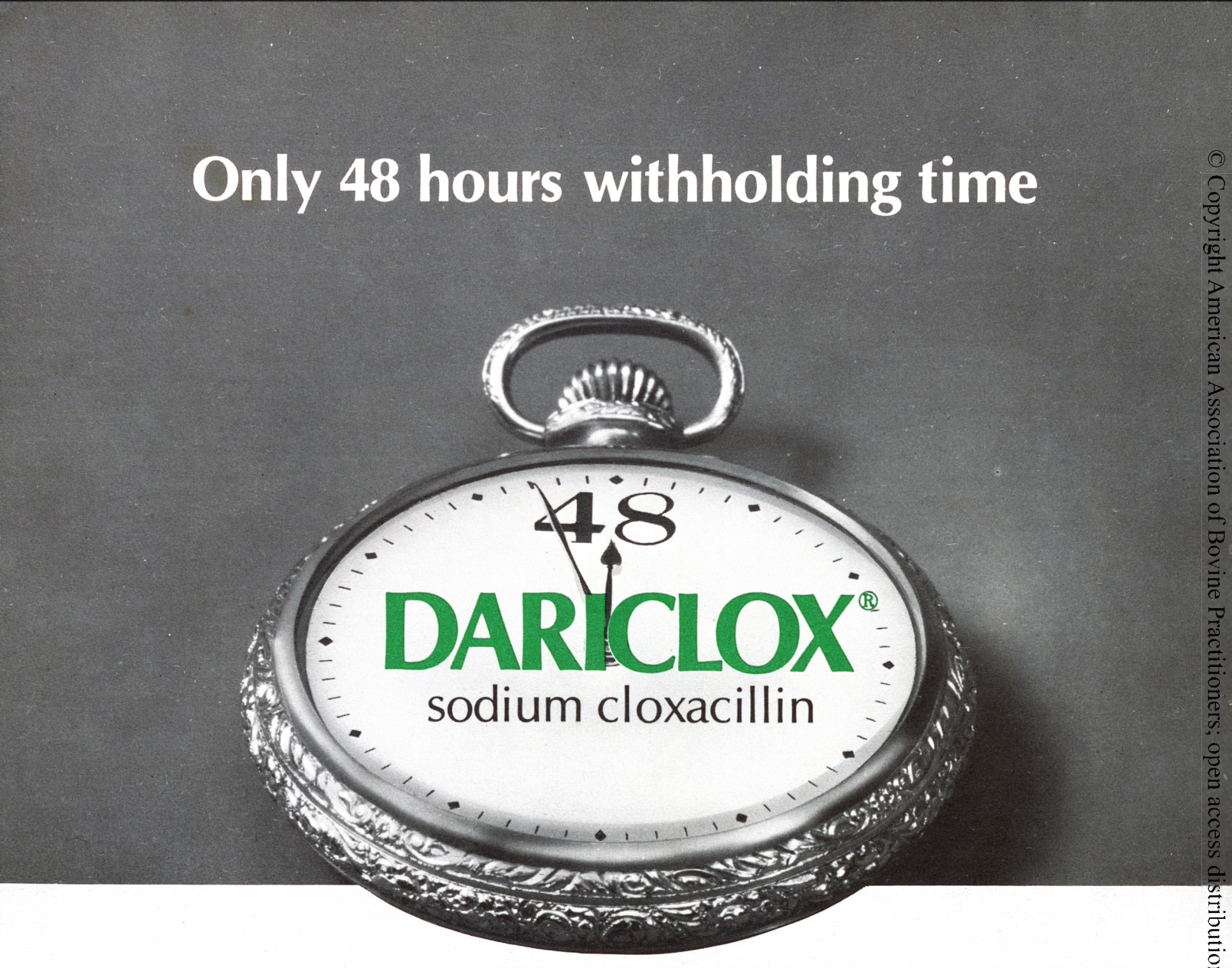

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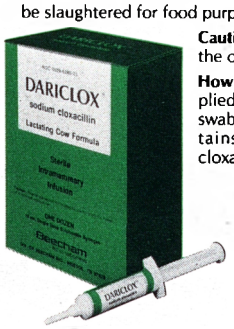

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Table 6

Analysis of Production Increase During the Experimental Period (1973-76) Over That Recorded Pre-experimentally (kg Milkfat/Hectare)

	Avg.increase in experimental herds	Avg. increase in control herds	Diff ± standard error
1973-74	6.1	-6.6	12.7 ± 11.4 (NS)
1974-75	52.6	19.1	33.5 ± 11.2 (**)
1975-76	66.8	25.4	41.4 ± 12.0 (**)
1973-76	41.7	12.6	29.1 ± 9.7 (**)

NS = Not Significant
** = Significant at 1% level

Table 7

Analysis of Gross Margin Gains Above the Average of Two Pre-experimental Seasons 1971-72 and 1972-73 ($ per Ha)

	Experimental	Control	Diff ± std. error
1973-74	-30.29	-27.14	-3.25 ± 19.60 (NS)
1974-75	43.56	17.00	26.56 ± 18.42 (NS)
1975-76	5.44	4.27	61.17 ± 21.37 (**)

NS = Not Significant
** = Significant at 1% level

NOTE: Gross margin = income from milkfat, stock accumulations and stock sales less costs of stock purchases, animal health, breeding, dairy shed expenses, purchased feed and fertiliser.

Table 8

Analysis of Animal Health Costs - $ Per Hectare

	Experimental	Control	Diff ± std. error
1971-72	12.30	9.75	2.55 ± 2.10 (NS)
1973-74	17.12	9.35	7.77 ± 2.88 (*)
1974-75	21.40	10.82	10.58 ± 3.53 (**)
1975-76	19.27	14.28	4.99 ± 3.84 (NS)

NS = Not Significant
* = Significant at 5% level
** = Significant at 1% level

NOTE: Animal health costs for 1972-73 were not included since it was during this season that the programme began and only some of the P.A.H.A.P.S. costs would have been included in the end of year accounts. The financial year on many farms in New Zealand runs from 1 June to 31 May.

service embraced all aspects of a farm operation (whole farm approach) and was provided by a veterinary surgeon who in turn sought co-operation from farm advisors and agricultural and veterinary experts in various fields. Much emphasis was placed on submitting plans of action to cost/benefit analysis, but at the same time a farmer's way of life was considered important. It is suggested that the concept of a planned animal health production service is economically viable and that any veterinary surgeon can adopt the approach, provided he creates conditions which will allow him ample time to give to this intensive integrated farm advisory service. The approach fits in well with traditional group practice and may be offered by full- or part-time veterinary consultants.

References

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