INTENSIVE DEER FARMING AND PASTURE

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CRAIGMORE, a family farming company, in late 1973 bought 256 ha of undeveloped light land, of predominantly Steward soils, 5 km north of the Waitaki River on the coast. The Papamoa farm is in the Morven-Glenavy irrigation area, the first scheme in New Zealand which planned to make maximum use of unlimited supplies of water on a whole area basis. The farm therefore had the water and no future limitation likely on its use. There was the promise of a labour-light automatic flood irrigation system. It was felt that this irrigated permanent ryegrass and clover management system would soften the periodic summer drought problems of Craigmore itself, and provide diversification.

At the same time that the property was bought, preliminary work at Lincoln College (Coop and Lamming, 1976) indicated that red deer might adapt very well to intensive stocking. This prompted Craigmore to experiment with a small number of deer, under an intensive irrigation regime. Because of the potential of deer found under such conditions, it is now intended to develop Papamoa for deer only. It will be financed and run as a separate entity from Craigmore.

The Papamoa property had no internal fencing, and little external fencing of any worth. It had no buildings or other fixed assets. It was found that, to establish the farm for deer required a similar capital cost to that for sheep and cattle. The expensive 1.98 m perimeter deer fence equated to the cost of facilities for sheep handling, such as shearing shed and sheep yards, and the deer yards are no more costly than a good set of cattle yards. Cattle can be handled in the deer yards.

Initially, some hand-reared weaner stags were bought. These were wintered under extremely intensive feedlot type conditions on fodder beet and chopped straw, and carried on to slaughter at 15 to 16 months. To these were added a number of hinds which were tranquillized in the hills and trucked to Papamoa. Since that time stags have been brought from an extensive farm

on to the property in partnership with Wilson Neill, a firm active in the deer procuring, processing and farming industry. These are finished for slaughter and **velvet** is harvested.

The early deer purchases made clear the high capital cost of the animals themselves and it was found impossible to increase stock numbers to the level desired from the farm's own resources. Papamoa was glad, therefore, to accept the offer of Wilson Neill to provide breeding hinds and stags at a ratio of 20 to 1, and share direct costs such as management and fertilizer; the returns **each** year would be divided and, on completion of the five-year partnership agreement, the base stock would be returned to Wilson Neill together with half the progeny.

There were very many apparently sound arguments for not running red deer intensively at Papamoa. **These** included:

- (1) **The** bleakness of the stony country and the rigours of the climate. Though the sunlight hours along the coast are maximized, and therefore optimum summer growth of grass with water can be expected, the coastal area **can** be desperately cold in **winter** and sometimes very **hot** in summer. The area is at present totally devoid of any shelter save the head race banks and borders.
- (2) The unknown effect of the deer themselves, intensively stocked on grass, on border and head race structures.
- (3) Doubts as to the control of deer with internal subdivisions of conventional height netting and 2-electric-wire fence (1.2 m total height).
- (4) Management queries and misgivings about mob stocking deer in 200 or 300 animal herds on paddocks of 6 to 10 ha.
- (5) The survival of the feral deer; the health of the farmed deer.

Other than heavy losses of newly captured deer (48 hours), these doubts have proved to be largely unfounded. The settled deer have thrived in the harsh Glenavy climate. On 18 ha, grazing pressures of 17 hinds/ha have been achieved for periods of nine months, from November 1975 until July 1976; during this period 21.4 fawns were born and reared to weaning on April 7, when they were removed to another area. In the same period, 700 bales of meadow hay were harvested from 5.5 ha, 1850 hoggets were grazed for two weeks, and 30 head of 15- to 18-month-old **cattle** grazed for four weeks.

During the 100-day winter, the 307 hinds were fed seven bales of hay per day — in fact, they used the 700 bales taken off the area. A hind's winter (June to September) appetite is very low and closely matches Papamoa's winter feed supply. Further, the fact that a deer's summer appetite does not start until early October relieves the farm of the familiar lambing-time feed shortage. Early December fawning suits summer irrigation feed supply; weaning in April leads to the roar and the end of the hind's summer appetite.

These facts and figures substantiate a 12-month self-supporting carrying capacity per hectare on this light irrigated land of 17 hinds plus their fawns to weaning. The same stocking rate of 17 ewes plus' lambs to weaning is achieved, leading to the conclusion that one hind is equivalent to one stock unit.

Intensively stocked deer graze pastures in a distinctive fashion compared with sheep or cattle, defoliating pasture from the top down, in contrast to the traditional animals. This non-selective grazing from the top leaves a very tight sward, the production of which is boosted by unusually strong urine returns. Deer-grazed pastures appear to produce more than do sheep or cattle swards.

Considerable erosion has been experienced with sheep, especially lambs, and cattle on borders and head races. It is now most apparent that no such erosion takes place with deer. Indeed, this sheep/cattle damage has been cured by stocking with deer alone.

The farm is only ring-fenced with the high deer fence. Subdivision is of the conventional height. The deer have not yet created a management problem with this subdivision. However, as a precaution, the farm is serviced by a central access race with the high deer fence dividing the area.

It is very important for effective deer farming, and essential for management techniques such as harvesting velvet, that deer are quiet. To this end, human contact is never avoided at Papamoa, even at fawning time. Quiet, but continual and attentive stockmanship is most important. It is a very significant bonus for intensive compared with extensive deer farming that this desirable quietening of stock can be more readily achieved under intensive management conditions.

Good stockmanship, stock sense and an understanding of animal behaviour are essential prerequisites for successful deer farming.

There have been few problems in handling mobs of 400 deer on 10 ha paddocks, and it has been discovered that moving them from one paddock to another is no more difficult, although often a good bit faster, than moving a mob of sheep or calves.

Care must be taken with stags during the roar. Stags are mated with the hinds in the ratio of about 1 to 20, and the one dominant stag will, even under very constrained and crowded conditions, ensure that he reserves most, if not all the mating for himself. Only sheer physical exhaustion or injury will deter him from this resolve.

To date, there have been no stock health problems (McAllum, 1976). Heavy losses were experienced on the initial arrival of deer **which** were tranquillized in the wild. These can be attributed to a variety of factors such as injury and shock, and **the very** rapid change in environment could have been a contributing factor. Since that settling period, deer deaths have been no greater than one would expect with sheep or cattle. Some weaner deer have been lost from pulpy kidney and the deer have had internal and external parasites.

The stock health policy is to inoculate fawns in March with multiple 5 vaccine, including selenium, and inject **the** weaner fawns at weaning with diethylcarbamazine citrate. This is administered once a day for three days for lung worm control. There have been no experiences of bloat, foot rot, or sleepy sickness.

We are now confident that the deer has outstanding qualities of feed conversion and grazing efficiency on grasslands, and that **its** low winter appetite compared with its summer appetite makes it a favoured animal to make maximum use of the growth pattern of all-irrigation intensive farming.

To show the economics of the venture (Clouston, 1976) and the relative profitability of sheep and deer, Papamoa's costs, prices and performance levels have been used (Tables 1 and 2), simplified to avoid stock agistment and stock ownership problems that occur in real life.

Deer are expensive. A breeding hind is worth \$250 and a yearling hind about \$125. By comparison, an average ewe may cost about \$15. It is considered that one hmd per ewe can be carried on Papamoa. Therefore \$15 sheep capital is to be compared with \$250 deer capital.

In a *status quo*, fully developed situation, Papamoa is assumed capable of running 4440 stock units. In sheep (see Table 1), 3800 ewes, 950 ewe hoggets and 76 rams, worth \$75 000, will

TABLE 2: RESULTS FROM RUNNING PAPAMOA AS A DEER UNIT

					<i>Hind Equivalent</i>
2944 Hinds @ \$250	\$736 000	2944 Hinds	....		2 944
1177 1-yr hinds @ \$125	147 125	1177 1-yr hinds	....		706
1177 1-yr stags @ \$65 ..	76 505	1177 1-yr stags	....		706
88 Stags @ \$200	17 600	88 Stags	....		88
5386	\$977 230				4 444
Natural increase — 80%		Deaths — 3%			
2354		88 Hinds			
		70 Yearlings			\$
		Sale —			
		1142 Stags (54 kg) \$2.64			162 160
		294 CFA (60 kg) \$2.64			46 450
	(NB Meat)	760 Hinds (451 kgj \$2.64			89 680
7740		7740			
Velvet —					
88 Stags (3 kg @ \$30)	...	...		\$7 920	
1142 rsg — 10-mth stags (1.5 kg @ \$30)	....	....		\$ 5 1 3 9 0	
					59 310
(Pizzles @ 53.50; tails, skins, sinews, teeth @ \$14 not counted.)					
Gross sale	...	....	....	....	357 600
Farm expenses (see Appendix 2)	....	....	...	....	41000
Farm surplus	.	...	....	....	316 600
Capital Investment:					
Stock	....	...	..	\$977 200	
Land and buildings				235 000	
Machinery	...	...		13 000	
				\$1225 200	
FM Surplus as percentage of capital investment — 25.8%					

TABLE 3: COMPARISON OF RETURN ON STOCK INVESTMENT, SHEEP AND DEER

	<i>Sheep</i>	<i>Deer</i>
Gross cash sales	\$66 766	\$357 600
Direct costs (see Appendixes 1 and 2)	\$22 332	\$25 732
Total gross margin	544 434	\$331 868
Stock investment	\$75 000	\$977 230
Gross margin as % of stock investment	59%	34%

price of \$30/kg. After subtracting farm expenses, but not counting interest on capital, a farm surplus of \$316 600 is found. This surplus is 25.8% of the \$1 225 200 invested in land, buildings, machinery and stock. These figures do not include the heavy losses of newly captured feral deer.

In the sheep enterprise, only one-quarter of the total investment is in stock. The annual sheep gross margin represents 59% of this stock investment. In the deer enterprise, on the other hand, three-quarters of the total investment is in stock. The annual deer gross margin represents 34% of this stock investment (Table 3).

These figures indicate that an existing sheep farm earns 9.6% on total capital invested and any additional investment in sheep alone will separately return 59%. The exclusive deer unit earns 25% on total capital invested and the marginal investment in deer will return 34%.

In order to create a return on capital of 9.6% for deer, the same as for sheep, deer product prices could fall to less than half current prices. Alternatively, at the quoted prices, Papamoa need carry only one-quarter of the estimated full carrying capacity in deer.

Papamoa considered four of many alternatives in developing its stock policies:

- (1) An all-sheep enterprise.
- (2) An all-deer enterprise.
- (3) An initial investment in deer and breed up.
- (4) A live-year deer partnership.

Cash flows are shown in Table 4 for each alternative. Support information is given in Appendixes 3 to 6. They include the initial total investment including land, the cash surplus each year and the final total assets on hand at the end of the period. For comparison, discounting procedures are used.

TABLE 4: ALTERNATIVE DEVELOPMENT POLICIES

<i>Year</i>	<i>Sheep</i>	<i>Deer</i>	<i>Breed Up</i>	<i>Partnership</i>
0	308 000	1225 000	420 000	320 000
1	9 766	316 000	27 494	28 994
2	29 766	316 600	52 610	39 898
3	29 766	316 600	54 599	40 473
4	29 766	316 600	63 046	43 382
5	357 766	1541800	678 518	442 460
Internal rate of return	9.5%	25.5%	18%	15.5 %

The internal rate of return is calculated and may be considered to be debt servicing and pre-tax profit for the particular investment. By comparison with sheep, a complete investment in deer offers a very high internal rate of return. This, however, is not a practical, or feasible proposition for the Fapamoa scale of operations because of the vast capital requirement and such quantities of deer are not readily available.

The alternative was to make an investment and breed up from there. A \$100 000 investment involving 400 deer was used. The pattern of enterprise change and stock sales is shown in Table 5.

TABLE 5: PATTERN OF BREEDING UP FROM \$100000 INVESTMENT

	<i>Sheep</i>		<i>Deer</i>
Year 1			
	3600 Ewes		390 Hinds
Sale	617 Ewe hoggets		
	700 Ewes		
	2817 Lambs		
Year 2			
	3387 Ewes		378 Hinds
Sale	783 Ewe hoggets	Sale	3 12 Yearlings
	711 Ewes		152 Stags
	2737 Lambs		
Year 3			
	3349 Ewes		518 Hinds
Sale	660 Ewe hoggets	Sale	302 Yearlings
	667 Ewes		146 Stags
	2749 Lambs		25 CFA Hinds
Year 4			
	3212 Ewes		624 Hinds
Sale	600 Ewe hoggets	Sale	414 Yearlings
	640 Ewes		201 Stags
	2689 Lambs		30 CFA Hinds
Year 5			
	3054 Ewes		776 Hinds
Sale	523 Ewe hoggets	Sale	500 Yearlings
	610 Ewes		242 Stags
	2629 Lambs		39 CFA Hinds
Completion			
	2561 Ewes		956 Hinds
	425 Ewe hoggets		620 Yearlings

The internal rate of return is 18% which is double that for sheep. Indeed Papamoa decided on this option initially, but irrigation development at the depth of the 1974 recession had starved the business of capital. In this situation, the fourth alternative, where Wilson Neill provided some base stock, seemed very attractive. No initial capital for deer was required. At the end of the five-year term, the original base stock are returned to the owners and the partners halve the remainder. Thus, in five years, the initial 390 hinds have grown to 956 hinds and 620 yearlings.

Of this, Papamoa own 283 hinds and 310 yearlings. The internal rate of return of 15.5% reflects the profitability of this low capital investment alternative.

Though we have spoken with some confidence, we must conclude on a note of caution. Deer farming, particularly intensive deer husbandry, is at an infant stage. Some major problems, not yet experienced, may still be encountered. In particular, there must be much more time and experience before one can be sure that deer under intensive stocking are not going to be prone to disease problems.

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The Manager at Papamoa deer farm is Robbie King who combines the rare gifts of good stockmanship and managerial and mechanical ability. These attributes, and his drive and enthusiasm, have contributed very substantially to Papamoa's progress, and the writers have relied heavily upon him for material.

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Sheep Farm Expenses

*Variable cost

APPENDIX 3							
All-sheep Development							
		Year 0	1	2	3	4	5
		(\$)	(\$)	(\$)	(\$)	(\$)	(\$)
Assets:							
Land	.	...					253 000
Sheep	...	.	...				75 000
Cash income	.		66 766	66 766	66 766	66 766	66 766
Total	...	...	0	66 766	66 766	66 766	394 766
Cash expenses	...	...	...	37 000	37 000	37 000	37 000
Stock	...	75 000					
Land and plant	.	233 000	20 000				
Total expenses	..	...	308 000	57 000	37 000	37 000	37 000
Cash flow	....	.	308 000	9 766	29 766	29 766	357 766

APPENDIX 4						
All-deer Development						
	Year 0	1	2	3	4	5
	(\$)	(\$)	(\$)	(\$)	(\$,	(\$)
Assets:						
Land						248 000
Deer						977 230
Cash income		357 600	357 600	357 600	357 600	357 600
Total	0	357 600	357 600	357 600	357 600	1 582 830
Cash expenses		41000	41000	41000	41000	41000
Stock	977 000					
Land and plant	248 000					
Total expenses	1225 000	41000	41 000	41 000	41000	41000
Cash flow	1 225 000	316 600	316 600	316 600	316 600	1 541830

APPENDIX 5
Development with \$100000 Deer Investment and Breed Up

	Year 0	1	2	3	4	5
	(\$)	(\$)	(\$)	(\$)	(\$,	(\$)
Assets:						
Land						253000
Sheep		.				52 190
Deer	.	..				303500
Cash income	.	.		8 000	63847	89 720
Total		.	.	8 000	63847	89720
Cash expenses				36353	37 110	37 425
Sheep		..		75000		
Deer		.	.	100 000		
Land				253000		
Total expenses		.	.	428000	36 353	37 110
Cash flow	.	..		- 420000	27494	52610

APPENDIX 6
Deer Development in Partnership

	Year 0	1	2	3	4	5
	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)
Assets:						
Land						253000
Sheep		.				52 190
Deer post partnership						9 1 6 5 0
Cash income			8 000	65347	77008	77898
Total			8000	65 347	77008	77598
Cash expenses	.			36353	37 110	37 425
Sheep	.	.		75000		
Deer	.			0		
Land				253000		
Total expenses			328000	36353	37 110	37 425
Cash flow			- 320000	28994	39 898	40473