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LARGE SCALE COMMERCIAL DAIRY FARMING IN UGANDA:

A FARM CASE STUDY

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LARGE SCALE COMMERCIAL DAIRY FARMING IN UGANDA:

A FARM MANAGEMENT CASE STUDY

by

G. Allanson and R.H. Phipps

The aim of this report is to give general guidance to any farmer intending to take up dairy farming on a large scale. The guidance offered is both positive and negative in character; positive in providing standards of performance which may be expected and in indicating critical areas in the development process, and negative in recording the vicissitudes of one new dairy business and the measures taken to rescue it from early misfortune.

In structure, the report alternates between these two aspects. It begins with a set of performance standards which should be achieved or improved upon, before turning to an analysis of the case study dairy herd in terms of its physical and financial performance. Reasons for the herd's worsening position are given next before a review of the remedial measures undertaken. Present trends are then projected and future development strategies discussed. The report concludes by analysing the prospects for new entrants into large scale commercial dairy farming, with some consideration of the phasing of herd expansion and of the likely financial implications of the early years.

Standards of physical and financial performance which should be attained.

Success in dairy farming, as in any other business run for profit, depends upon the regular achievement of appropriate levels of physical efficiency. Key areas, and reasonable performance levels are outlined below:

1. Milk yields per cow per year of 450 - 600 gallons. This will require lactation yields of 550-700 gallons and an average of less than one quarter of the herd dry.

2. Calving intervals of not more than 390 days on average. This would follow from a period of 60-90 days between calving and first service, and of 21 days between subsequent services. In addition, conception rates of 60 per cent at first service and 50 per cent at second service should be attained.

3. Mortality of not more than 8 per cent of live calves born, and of not more than 4 per cent of mature cattle.

4. Stocking rates initially of one acre of established pasture per adult animal until more experience has been obtained on seasonal carrying capacity. The emphasis must be on the production of high quality forage.

5. Supplementary feeding to cost not more than 30 per cent of the value of milk produced. Remember that good grass is much the cheapest source of feed.

6. Labour initially at one man per 10-13 cows according to milk yield, when milking is by hand, plus field workers. A fully stocked farm might require 10 men for 80 cows on 200 acres.

7. Size of business should be adequate to justify a full-time farm manager and an appropriate range of tractor-drawn implements.

Attainment of these standards would lead to a profit of between 500/- and 900/- per cow. It should be remembered that the necessary replacement stock would make much less profitable use of the land.

Although these standards should be reached by any efficient fully-operational business, the next sections show what was actually attained in the first two years, when a newcomer to dairying embarked on a large scale dairy farming.

Physical performance of Case Study Herd No.1

Mailo land was acquired in 1968 and preparations made for dairy farming the following year. Data relating to the main efficiency factors have been derived for the twenty months up to mid-year 1971.

1. Milk yields averaged 408 gallons/lactation with an average of 21 per cent dry cows. The distribution of completed lactation yields is shown below:

	Gallons per lactation						
	100-199	200-299	300-399	400-499	500-599	600-699	700 & above
	Number of Cows						
Fresian	1	3	9	4	8	3	1
Jersey	1	4	5	2	3		

2. Calving intervals fell into two distinct periods. From December 1969 to May 1970 there was a very creditable average of 376 days between one calving and the next but, from June 1970 to August 1971, this increased to an average of 489 days. For the whole period, the days to first service and the days between subsequent services are shown below:

	Average number of days.	Range	Number of Cows
Calving to 1st Service	110	32-299	61
1st - 2nd	86	17-207	23
2nd - 3rd	72	42-119	12
3rd - 4th	162	58-331	6
4th - 5th	35		1

Conception rates shown below were satisfactory for the first half of the period up to August, 1970:

Number of Services	Conception rate at each service	Number of cows conceiving	Proportion at different Service
1	61	69	61
2	52	23	20
3	62	13	12
4	87	7	6
5	100	1	1

3. Mortality amongst calves ran at 43 per cent up to October 1970, but it has fallen to 10 per cent since a full time experienced farm manager has been appointed. Losses amongst animals were also very heavy at some 20 per cent of all purchases but two thirds of these losses were due to one major breakdown in health.

4. The actual stocking rate is difficult to establish when more land is being cleared, new pastures established, and herd numbers built up simultaneously. Increasing emphasis on high quality forage production should be noted:

August 1969	40 acres poorly established.
March 1970	10 acres poorly established.
March 1971	3 acres well established.
September 1971	15 acres of maize well prepared and and undersown to chloris plus 1 acre of desmodium.

5. Supplementary feeding averaged some 27 per cent of the value of milk but it should be recalled that milk yields were low so that less feed would be expected. The main supplements were maize and cotton seed cake. The following table shows that feed levels varied erratically in relation to season and milk yield, with an overall average of 3.6 lb per gallon:

	lb. per gallon	cost as % milk sales		lb. per gallon	cost as % milk sales
1970			1970		
January	4.6	32	October	4.6	35
February	2.4	18	November	3.3	24
March	1.7	13	December	5.4	41
April	0.9	6	1971		
May	1.4	11	January	4.1	31
June	3.1	23	February	3.0	22
July	3.0	22	March	1.4	10
August	6.6	49	April	2.1	16
September	6.4	48	May	7.2	54

6. Labour costs rose from 1150/- per month in April 1969, to 2200/- in August, 1971. This cost however, relates more to establishment work than to general management.

7. Finally, the herd was built up from 4 cows in milk in December 1969 to a total of 53 cows in milk and dry, plus 11 heifers in calf and about the same number of younger stock in August 1971. At this size, turnover is sufficient to justify professional management and some degree of mechanisation. The importance of the rate of build up should not be under rated.

It is clear from the physical criteria that the herd's performance fell far short of "reasonable expectations". The financial consequences are briefly reviewed in the next section.

Financial Consequences: 1969-71

An increasing annual deficit is recorded in the audited accounts for the last two trading periods. Capital losses mounted until current liabilities exceeded both current and total assets. Allocation of revenues and direct expenses between enterprises showed the dominant role of the dairy herd in the farm organization in 1971:

	Financial year 1969-1970	1970-1971
	Gross Margins (shs)*	
Cattle	-25863	14069
Poultry	7653	- 9072
Coffee	471	60

* Revenue less direct expenses but excluding labour, power, machinery and overhead charges.

After a somewhat arbitrary allocation of common costs, it is possible to attribute to the cattle the other business overheads.

Business overheads in 1970-71 amounted to 37,385/-, covering secretarial and accountants' fees, insurance, security, general expenses, bank charges, and interest on capital. Other expenses, admissable for tax purposes have been omitted as not necessarily incurred by the business. With the switch from laying hens to broilers in 1971, it is prudent that these overheads should be covered by dairy receipts after paying for seeds, fertiliser, feed, labour, etc.

In 1970-71, the dairy account did not quite cover expenses:

Closing reduction at 31st March 1971	105355	
Opening reduction at 31st March 1970	36400	68955
Purchases of cattle		57139
Net output		11816
Livestock sales and dairy produce		59005
		70821
Feeding stuffs	23298	
Pasture regeneration	14832	
Vet.Services & Supplies	10833	
Fuel and transport	7789	
Repairs and Maintenance	600	
Depreciation	11216	
Wages	16885	85453
Deficit		14632

However, this deficit includes substantial expenditure on pasture establishment and the twelve-month period conceals the considerable build up in productive stock,

Before considering the present potential of the herd, it is worthwhile to identify more precisely the reasons for the mounting deficit and the remedial steps which have been taken so far.

Interpretation of past performance and problem diagnosis

A marked deterioration in many of the key efficiency factors is evident after June, 1970. The decline occurred when stock numbers were greatly increased without any corresponding increase in the area of good quality pasture, and before the employment of a full time experienced farm manager.

Deficiencies in planning and general managerial skill led directly to:

1. Thedecline of milk yield during the first two months of lactation from 600 litres per cow in late 1969 early 1970 to 400 litres after August, 1970.

2. The drop in milk yield between first and second lactations.

3. No planned programme of supplementary feeding existed to maximise the response to concentrate over the lactation.

4. The sharp increase in concentrates fed to dairy cows after July, 1970.

The need for greater managerial expertise was shown in various other ways apart from nutrition:

1. 110 days elapsed between calving and first service and there were long intervals between services.

2. Calf mortality was 43 per cent of calves born after the build up in stock number.

3. The longer calving interval increasing from 376 days to 490 days.

4. Reliance on the Tractor Hire Service at Mukono led to poor pasture establishment before 1971 so that, after the herd expansion in May/August 1970, forage was insufficient in quality and volume to maintain milk yields, breeding performance and concentrate levels.

5. Half of the increase in the wages bill was paid to charcoal burners.

In summary, management was capable of giving good results when few cattle were kept but failed to anticipate the problems of herd expansion and to prevent a decline in performance which led to serious financial loss.

Recognition of this situation has already led to a major re-shaping of farm policy, after an initial period of learning by hard and costly experience.

Remedial Measures up to August, 1971.

Vigorous steps have been taken to improve the day to day management, feed availability, breeding and cost control.

A farm manager was engaged in October, 1970 to supervise the running of the farm and this quickly led to a dramatic decline in calf martality.

The forage programme has improved in both planning and implementation. An experienced tractor driver was hired in June 1970, and disc harrows were bought so that the farm now owns all the equipment needed for pasture establishment. Timely cultivation resulted in good pasture establishment in 1971 and 120/- per acre of pasture established were saved on seed alone by reducing the seed rate from 15 lb to 5 lb per acre. Forage crops such as maize, guatemala grass and desmodium have been introduced.

A "cow calender" has been introduced as a aid to regular breeding and general management. In addition two young pedigree Fresian bulls have been bought so that natural service will be available at a later date as an alternative to A.I.

More young crossbred stock have been purchased to raise the business turnover and at the same time, the wage bill has been pegged at 1500/- per month. A monthly budget of income and expenditure was drawn up in July, 1971 as a further measure to improve business control.

This budget indicated a monthly deficit of over 3000/- unless repayment and interest factors were rescheduled or turn-over was increased. The budget for July, 1971 was as follows:

Expenditure		Income	
Wages and salaries	1500.	Milk sales	4750.
Feeding stuffs	2500.	Broilers	2500.
Fertilisers	120.	Eggs and sundries	500.
Electricity & diesel	400.		
Veterinary, repairs, Insurance, Secretary, Accountant, Stationery etc	530.		
Surplus	2700.		
	7750.		7750.

This surplus of 2700/- had to meet tractor payments and bank interest and repayments. It is clear from these figures that further action is needed before the business is on a sound financial footing.

The implications of the present organisation are analysed next in greater detail, before considering development strategies to make the herd viable.

Dairy Herd status, September, 1971 and projected cash flows 1971-73

At the end of September 1971, the case study herd consisted of 53 cows in milk or dry, 11 in calf heifers, 5 fifteen month old heifers, 24 heifers under one year old, and 12 bullocks: in all, some 82 livestock units. Starting with the stage of lactation of cows presently in milk, and with future calving dates known from pregnancy diognosis, it is possible to project milk sales and concentrate requirements. Deduction of other expenditure leaves the cash flows available to meet capital repayments. In this way it is possible to establish some idea of the potential of the present dairy business and to provide an independent basis for monitoring its performance.

The basic assumptions built into the projections were as follows:

1. Fresian lactations of 2270 litres in 305 days for cows calving in 1971 and of 2724 litres from January, 1972 as management improves; Jersey and cross - breds to give 454 litres less.

2. A calving interval of 14 months.

3. Lactation curves according to the following monthly

patterns derived from past performance, irrespective of date of calving and lactation parity;

Breed	Milk yield in litres	Month of milk production since calving: Litres per month 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Fresian	2270	227	341	304	263	236	218	195	168	163	154
	2724	272	409	363	318	295	250	227	209	200	182
Jersey	1816	182	272	250	204	191	173	154	136	127	127
	2270	227	341	304	263	236	218	195	168	163	154

4. Concentrates fed at 1035 kg per lactation for Friesians, irrespective of lactation yield, and slightly less for Jersey, according to the following monthly pattern:

Cows calving in:	Month of milk production since calving: Kg Concentrates per month 1	2	3	4	5	6	7	8	9	10
1 Dry Season										
Fresian	210	210	180	90	90	90	90	30	30	15
Jersey	190	190	160	60	60	60	60	20	20	15
2 Wet Season										
Friesian	200	200	180	100	100	90	90	30	30	15
Jersey	180	180	160	80	60	60	60	20	20	15

1. December - January - February and June - July - August.

2. March - April - May and September - October - November.

The validity of the projected levels of milk yield and concentrate requirements was established by the reasonably close comparison of the actual July to September levels of 1971. Between October 1971, and August 1973 first calverswere expected to raise the herd from 53 to 67 cows in milk or dry. No allowance has been made for deaths.

	Milk produc. (litres)	Concent. fed (kg)	Value of milk @ 3/80 Ss/ gall	Cost of concent. @ 60 cts kg	Margin of sales over concent.
				Shillings	
1971					
July	5073	2110	4237	1266	2971
August	5027	2290	4199	1374	2825
September	5560	2540	4644	1524	3120
October	5910	2580	4936	1548	3388
November	5764	2965	4815	1779	3036
December	6770	3645	5654	2187	3467
1972 January	7839	4080	6547	2448	4099
February	8713	4365	7277	2619	4658
March	9140	4085	7634	2451	5183
April	10132	4370	8463	2622	5841
May	10519	4045	8786	2427	6359
June	9591	3605	8010	2163	5847
July	9382	3400	7836	2040	5796
August	10260	4000	8569	2400	6169
September	11447	4810	9561	2886	6675
October	11761	4930	9823	2958	6865
November	11807	4355	9861	2613	7248
December	10496	3580	8767	2148	6619
1973 January	10583	4065	8839	2439	6400
February	11388	4820	9511	2892	6619
March	11793	4740	9850	2844	7006
April	12093	4425	10100	2655	7445
May	13167	4820	10997	2892	8105
June	14000	5600	11693	3360	8333
July	13286	5435	11096	3261	7835
August	12143	4505	10142	2703	7439

Note all months assumed to be 30½ days.

From the above projections, it can be seen that milk production is expected to increase steadily till the middle of 1973. The gradual rise in margin over concentrates reflects the improvement in milk production. It should be noted that a 16 per cent saving in concentrate costs due to feeds costing 50 cents rather than 60 cents per kg, would raise this margin by almost 5000/- in 1972.

In addition to providing a basis for detailed forward planning, these projected flows would enable the farm manager to exercise a form of budgetary control over his dairy business.

Indications of short comings might be remedied before the situation had deteriorated too far. Bank managers would also be able to guage more precisely the creditworthiness of their clients and the loan repayment schedule which their business could meet.

From these margins over concentrate, must come the payments for all other expenses incurred in milk production. Costs have been estimated for the first six months and at a slightly higher monthly level, for the first twelve months. Details are given below, together with a monthly estimate based on the first six months which may be compared with the month's margins over concentrates shown earlier:

	Oct/March 1971 - 2	Oct/Sept 1971 - 2	Cost Est. per month
		Shillings	
Wages	9000	18000	1500
Concentrate for 'steaming up' at 25/- per cow	525	1050	88
Seeds for 15 acres	900	1800	150
Fertiliser on 92 acres	1200	2700	200
Vet & Medicine at 17/- per head	1020	2040	170
A.I.	120	240	20
Dairy Sundries	150	300	25
Power & Machinery Electricity	500	1000	83
Fuel	750	1500	125
Repairs etc	250	500	42
Tractor Repayments	9000	18000	1500
Insurance	500	1000	83
Security	900	1800	150
Secretary, Stationery, Accountant, Audit etc	900	1800	150
			4286

Tractor repayments would cease about mid-1972 but after that date fertiliser costs might have to be increased to maintain soil fertility.

If calves exactly offset herd depreciation and beef sales offset deaths the present herd, would go from a current monthly deficit of 1500/- to a deficit of 500/- by the end of 1971, and a break-even position two months later. This ignores the need to pay both interest and principle on loans received. Interest would

defer the break-even position until tractor payments cease in mid-1972 and the surplus avaiable to repay loans would never exceed 2500/- per month, even under the rather optimistic assumptions of no deaths and lactation yields of 2724 litres. Meanwhile additional liabilities amounting to over 40000/- would have been incurred before the break-even point was reached.

Given the level of capital repayments which have to be made it is clear that further measures are desirable to raise the profitability of the business. The choice lies between more cows, beef cattle, replacement heifers and broilers or a combination of these enterprises.

Alternative strategies for the future development of the Case Study Farm

A surplus of about 3500/- per month, or 40000/- per year, is needed if the losses up to mid-1972 are to be recouped over the succeeding five years. An additional 1000/- per month would be needed if the business were also to become wholly owned over the next ten years.

An obvious first step would be to see whether capital repayments and interest could be rescheduled. It is possible that cheaper loans may become available through the East African Development Bank, or there may be other sources of credit at less than bank rate.

The major objective of the next 12 to 18 months is to consolidate the present position before further expansion is undertaken. It will be recalled that the cash flow projections were based on improved levels of performance after 1971. The stocking rate has risen to just under one livestock unit per acre of improved pasture and herd size has increased. Really skilful management would be needed now if performance were to be maintained.

In practice, the rate at which the herd should be increased depends directly on the establishment of more improved pastures and on the continuing availability of credit. It is considered that the present farm staff could either, clear and establish not more than 10 acres of new land per year or, renovate up to 25 acres of existing pastures. On the assumptions that carrying capacity should remain at one livestock unit per acre and that renovation would double the production from existing poor pastures, and additional 6 cows and followers could be kept per year.

Each additional cow might be expected to raise farm revenues by 75/- per month, after deducting direct costs:

Marginal revenue per year from one extra cow and followers

Income	Shillings per year	
2750 litres per 14 months @ 3/80 per gall.	1955.	
Cow every 4 years	100.	
Bull calf every 3 years	60.	
	2115.	
Expenditure		
Concentrates for milk production & 'steam up'	655.	
Concentrates for rearing heifer calves	160.	
Miscellaneous (Vet, A.I., Sundries)	25.	
Labour	100.	
Interest on capital	100.	
Variable costs of $1^{2/3}$ acres of forage	175.	
		1215 900.

Thus an additional 13 or 14 cows and followers would be needed to achieve a surplus of 3500/- per month instead of the projected 2500/- and an additional 27 cows to achieve 4500/ per month. Expansion on this scale would have to be phased over the next three to five years, and it would also require the dairy buildings to be re-sited. As the access to the present building would then be inadequate.

At an estimated cost of 100/- per cow for building and access road, some 5000/- extra capital after subsidy would be needed for this move.

Although the expanded herd could be an extremely profitable unit at present levels of milk prices and projected levels of performance, it is clear that the expansion process would require careful phasing in relation to cash flows and bank borrowings. Before considering the profit potential of the dairy business when organized in this way, it is important to consider first whether any alternative strategy might be more attractive.

The alternative actively under consideration is broiler production, of which the manager already has some experience and for which suitable buildings already exist. If 3 batches of 500 birds are produced each year by one man part time, a surplus at

present prices of 2850/- per year might be obtained for an average outlay of some 7500/- on working capital. This compares unfavourably with dairying where the 3 cows and followers required to give a comparable income would require some 5500/- extra capital.

However a broiler enterprise might be a valuable supplementary enterprise at least until the performance of the existing dairy herd is stabilised at a higher level. In the longer term the pressures acting to reduce broiler profits are probably greater than those acting on milk production, so that a slightly deferred expansion of the dairy herd appears appropriate. The future emphasis when expansion takes place should be on milk production rather than on beef or dairy replacements because of its greater profitability.

Some indication of potential is given next since it is helpful if a manager can envisage the probable future organisation and income characteristics of his business. Given present prices and anticipated performance, it would seem reasonable to anticipate a dairy herd of at least 80 cows and followers on 145 acres of improved pasture, together with a beef unit to use additional land and a broiler unit to generate additional profit. Profits from the herd, subject to interest and capital repayments, might be as follows:

Income		Shillings per year
80 cows at 1955/- per year		156400
Cull cows and calves at 160/- per cow		12800
		169200
Expenditure		
Concentrates at 815/- per cow and followers	65200	
Miscellaneous - Cows	2000	
Replacement cattle	2000	
Labour: 10 men plus manager	24000	
Fertilisers	9450	
Seeds	3550	
Power & Machinery	10000	116200
		53000
Overheads		5000
Investment Income (to meet interest and capital repayment)		48000

Profits from the broiler and beef units could be additional to the surplus from the dairy enterprise.

Further speculation on the future development of the Case Study Farm would be of questionable value because of the time span and uncertainties involved. It may be asked whether this venture into large scale commercial dairy farming was a financial success. The answer must be in the affirmative but highly qualified because only the strength of the owner's credit tided it over a costly learning period. There is no doubt that its development could be improved upon if the farmer were to start again, with his present knowledge. The technical and business aspects, where the closest managerial attention must be focussed, are discussed in more general terms in the concluding chapter. Only if these points are observed can the newcomer to dairying attain the standards set out in the first chapter without acute financial embarassment.

Some procedures recommended for the setting up and running of a large scale commercial dairy farm in Uganda

Clearly it is not easy to establish a large dairy herd from small beginnings and to operate it at or improve upon the levels of performance set out at the beginning of this report. In this concluding section some important technical features of milk production are identified and tentative proposals are made for improving performance. Finally questions of farm business organisation and management are discussed together with appropriate recommendation.

a) Recommendations on major technical issues in milk production

Experience from the Case Study Farm has shown that major financial deficits can be reduced as technical difficulties are mastered. Proven modern techniques can greatly increase the managerial control in three major productio areas. These relate to seasonal fluctuations of forage, breeding and health control.

1. Seasonal fluctuations in forage production

Grass and forage crops are the cheapest source of feed but shortages of forage may occur during the dry seasons when natural growth is at its lowest level. These "hungry gaps" must be filled if milk production is to be maintained.

Dry season shortages of forage can be alleviated by the application of fertilisers at the end of the rainy season, the use of new leys established in the previous rainy season and by forage crops such as maize, guatemala, columbus or elephant grass, forage sorghums, and grain and forage legumes. Molasses and urea could be fed as a supplement on their own, or in conjunction with forage crops. Forage conservation, for the dry season, in the form of hay or silage requires considerable capital expenditure, and is in most cases beyond the means of the majority of commercial dairy farmers. However, farmers can determine the calving pattern to some extent and ensure that the herd makes its biggest demands on forage when it is in plentiful supply at the beginning of the wet season.

The critical importance of high energy feeds in the early stages of lactation cannot be overemphasized. The peak milk yield achieved determines the level of production at all later stages and hence, the total production. In addition to providing quality forage to new calvers, concentrates should be fed well in excess of the recommended rates per gallon. Conversely, savings can be made in the last third of the lactation.

2. Breedings

Ideally cows should calve once a year. If the calving interval is greatly extended herd production will suffer. In the tropics long calving intervals are common, and may be due to poor nutrition, mineral deficiencies, the occurrence of silent heats, untimely inseminations and poor perception of cows in heat. These breeding difficulties can be greatly reduced by better nutrition, recording in readily accessible form both insemination dates and expected dates of return to service, by the use of natural service, visual aids to breeding such as the cow calender, and as a last resort the use of teaser bulls. Regular veterinary inspections should be made of the cows which are persistently bad breeders.

3. Disease Control

Routine vaccinations for foot and mouth, rinderpest, haemorrhagic septicaemia, anthrax and blackquarter, and routine tick control measures and deworming are essential if a major breakdown in health is to be avoided. The annual cost of these disease control measures is approximately Shs. 17/- per animal, and are therefore well worthwhile.

Considerable loss of production also occurs when affected animals are recovering from disease and also from sub-clinical diseases such as mastitis.

Close attention should therefore be paid to hygienic milking.

Performance in these three major areas of dairy management determines the ability of cows to express their true genetic potential for milk production. Cows on commercial dairy farms should be of such a quality that their genetic potential can be realised under the prevailing management and environmental conditions. There is no economic merit in paying higher prices for high performance animals whose potential will not be expressed.

b) Aspects of dairy business planning and control.

The items discussed below are not comprehensive but their importance has been demonstrated on the Case Study Farm.

1) Lower performance occurs in the initial period of establishment

Whole farm budgets invariably overstate the actual performance that will be achieved during herd establishment. Typically, performance improves over the next three years before attaining the long run expected level. A cost for " running-in " the business is inevitable but its level can be reduced by careful planning.

2) Pace and phasing of development is slower than expected.

The urge is to expand as rapidly as possible so that overheads may be spread more thinly. Some caution is needed, with pauses for consolidation and improvement in efficiency. If early results are severely depressed below budget levels, a rapidly expanding herd may run into a position of "over-trading" when short term liabilities exceed current assets. Any loss of confidence by creditors or chance recall of loans would then lead to the sale of productive assets such as milking cows. In such cases businesses could be forced into liquidation or their development severely crippled. Despite the gambler's instinct to put all available funds into productive stock, it is desirable to maintain some fairly liquid reserves in order to cope with the early short fall on budget expectations and with any possible withdrawal of borrowed capital.

3) Managerial skills are worth rewarding

Good managers are rare in any country and even adequate managers are scarce in Uganda and other developing countries. For skilful managers payment should be commensurate with the

responsibilities of the final planned size of business so that an experienced man may be attracted. Payment of between 4 and 7 per cent of turnover, depending on business size may be taken as a guide.

4) Match stock requirements with the feed available

The speed with which dairy cattle may be bought and numbers increased contrasts with the need for long-term planning and the slow maturation of home grown forage supplies. The temptation is always to overstock before carrying capacities are known throughout the year and before feed reserves have been planned against unusually dry seasons. Despite the availability of cheap molasses in many areas, emergency supplies are costly and production may be impaired for the following twelve months. It is essential to plan the forage programme in advance and to match stock number to the supply available.

5) Business recording is valuable for control and planning.

The critical evaluation of the preceding Farm Case Study and its forward planning were only possible because records existed. If these records had been analysed earlier in order to serve as controls for herd and business performance, it is probable that quick remedial action would have been taken. Only simple records which will actually be used should be kept. Breeding records are important as we saw earlier, individual monthly or weekly milk yields can aid feed rationing and herd selection, and some form of individual cow rationing and feed reconciliation is worthwhile.

6) Forward Planning is needed

Technically efficient businesses may still fail because their turnover is insufficient to meet overhead expenses. Financial stability and the process of herd expansion may be jeopardised because private drawings on the business account have been too heavy or because capital investment has been poorly timed in relation to cash flows. Single - minded pursuit of excellence in dairying may blind the manager to the fact that other enterprises may give greater returns to the resources at his disposal. The benefits obtained from each separately accountable unit of the business should be weighed against the costs and the income from alternative activities. In short, time spent on forward planning may be time well spent. Some of the basic concepts and tools have been illustrated already in the study of Farm Case No.

l so they will not be repeated here.

Finally it is worth stating that the authors are fully aware of their cavalier treatment, of production possibilities, input - output relationships and precise estimation of the most economic rates of yield, feed and stocking. The practical constraints which operated on the Case Study Farm and thier intractability are not immediately apparent to the onlooker. Above all it was the author's conviction that the many newcomers to milk production in Uganda were in urgent need of immediate advice if past mistakes were not to be repreated. The ultimate approach to the problems posed by dairy expansion in a region of climatic and biological uncertainty would require a degree of complexity and sophistication which might rarely be justified by the benefits obtained. In focussing on both technical and economic problems in this explanatory report on dairy herd establishment, the authors hope that new entrants will be helped in their objective to create a viable business.

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