1,000 acres. We are anticipating that it will carry about 500 head of steers in a few year's time. I've come to the conclusion that we won't get any advantage from sub-dividing it because it is always eaten down pretty well level all the way round. The only thing is that 500 head is an unwieldy mob to handle and we might cut it in half for ease of working. If you are going to sub-divide, sub-divide so that the cattle will use the available country to the best advantage.

Mr. Harrison: On this set stocking basis, beasts normally prefer fresh new growth. Yet, where your stocking rate is set it can't be set to the optimal level for all times of the year and some parts of your pasture are going to go rank, while the stock continually graze the short stuff in other parts of your paddock. Isn't this so?

Mr. Shaw: If you find they are grazing in one part of the paddock you've got to sub-divide and make them use the rest. But my point is if there is even grazing there is no advantage in sub-division.

Mr. Harrison: If you get even grazing you are in the right sized area.

Shouldn't sub-division be aimed at preventing the transference of fertility from your slopes to your stock camps?

Mr. Roberts: All the work that I know, as far as the advantages of rotational grazing are concerned, has been done on temperate pastures and after our experience here I am not at all convinced that this is applicable to tropicals. With tropical pastures we've generally got too much feed of a low quality and with rotational grazing, if you rotate every eight weeks to suit the legume growth which is much slower than the grass, by the time you put the cattle in you've got grass that they won't eat. Under set stocking they are running around and nibbling the grass all the time and not worrying too much about the legume while the grass is nice and sweet. There is very much better utilization of the grass during the summer time and a saving of legume for when you need it in the winter. This is what appears to be happening here and I am quite convinced we have had more beef per acre off these set-stocked paddocks than we have had from those that have been rotationally grazed. This may just be a question of management and we may not have been rotating at the right rate. This is what we want to find out.

SOME ASSESSMENT IN RELATION TO LAND DEVELOPMENT — NERANG AREA

by

W. F. Y. Mawson, Department of Primary Industries,

Development Planning Branch, Brisbane.

Pasture productivity per acre through animals is the product of two factors, namely liveweight gain per animal and stocking rate. There is one important qualification from a practical view-point in relation to pasture fattening on highly developed areas. This is the need to have available a continuous supply of pasture of adequate quality to produce an acceptable trade carcass without any interruption in the growing and fattening process. Efficiency of utilization required that as much of the pasture as possible be used for productive purposes and this is best achieved by the maintenance of rates of gain as high as practicable.

What level of beef cattle productivity can be expected from animals grazing these pastures? I am not aware of any systematic studies being made in this area but it may be worthwhile to refer to performance in other places, which have at least some factors in common.

Pastures not greatly different from some species being used here are established at both Beerwah and Coolum on the near North Coast. These are C.S.I.R.O. and D.P.I. stations respectively and neither operate on a commercial basis. Animal performance has been measured for some years, and the following have been reported.

C.S.I.R.O. (Beerwah)	Com. grazing	No. of days	Weight gain per head	Rate of gain per head per acre
24 head	May 15, 1964	218	335lb	1.54lb
48 head	Dec. 19, 1964	358	504lb	1.41lb
72 head	Dec. 19, 1965	84	224lb	2.40lb

D.P.I. (Coolum)

Over a three-year period using steers 20 to 24 months of age at commencement and stocked at the rate of one beast to 1½ acres, an average annual liveweight gain of 450lb per head or 1.23lb per day. This is equivalent to a liveweight gain of 300lb per acre. In terms of carcass gain per acre the figure would be approximately 200lb.

At the Bureau of Tropical Agriculture near Innisfail and the out-station at Utchee Creek a series of performance recordings extended over 5½ years at the Bureau and two years at Utchee Creek. Pastures comprised tropical legumes, mainly centro. and stylo. with guinea grass, para grass and molasses grass. During that period, 12 different groups of steers ranging in age at commencement from 11 to 30 months and comprising a total of 195 head were recorded with summarized grouped results as follows:

	Mean	Range (lb)
Initial weight	567lb	404 – 830
Final weight	1,037lb	811 – 1,373
Average duration	328 days	181 – 711
Average gain	470lb	
Average daily gain	1.43lb	0.80 – 1.8

In a further study at Utchee Creek a group of 71 head gained 170lb liveweight gain in 102 days — an average of 1.67lb per day.

The performance of fattening steers has also been recorded on tropical-type pastures under irrigation at Ayr Cattle Field Station and Parada Experiment Station — both operated by D.P.I. A series of eight groups of animals was recorded at Ayr from 1950 to 1958 for an average gain of 1.1lb /day (range 0.81 to 1.82) at an average stocking rate of nearly 1.5 beasts per acre.

At Parada, west of Mareeba, observations on weight gain extend back to 1966 and include treatments with varying rates of nitrogen and different stocking rates.

Average individual animal performance is as follows:—

Group 1 — April to August, 1966 (140 days)

(a) Liveweight gain 243lb — 1.73lb /day

(b) Liveweight gain 240lb — 1.71lb /day

Group 2 (a) Pangola — August to November, 1966 (63 days)
Liveweight gain 106lb — 1.68lb /day
(b) Para. — April to November, 1966 (196 days)
Liveweight gain 255lb — 1.30lb /day (range 1.16 to 1.39)

Group 3 (a) Pangola — November to June, 1967 (196 days)
(i) Liveweight gain 304lb — 1.54lb /day
(ii) Liveweight gain 402lb — 2.04lb /day

Group 3 (b) Para. — November to May, 1967 (168 days)
Liveweight gain 327lb — 1.94lb /day (range 1.83 to 2.00)

On the basis of the foregoing, we have little ground for expecting liveweight gains in excess of 2lb. a day over periods of 150 days or more and in fact an average figure of approximately 1.5lb. per head per day for grazing animals could be near the mark.

Stocking Rate

The long term optimum rate is a contentious and elusive subject. Under dryland conditions it has not yet been demonstrated that perennial pastures will fatten more than an average of one beast per acre on an annual basis.

There are considerable managerial problems associated with attempting to match the rate of pasture productivity with numbers of stock. If reliance is placed on sown pasture only, there seems some doubt that an average annual stocking rate beyond one beast per acre can be relied on at this stage of our knowledge, and it could well be considerably lower.

Combining weight gain per head at 1.5lb /day at one beast per acre, the annual per acre productivity would be approximately 540lb liveweight. If 66% of this is carcass gain then carcass production per acre would be 360lb per acre annually. This is considered to be a somewhat optimistic estimate.

Assuming that animals are bought and sold at the same price per 100lb the gross return from 360lb carcass gain would be as follows:

	Gross return per acre	
Price per 100lb	360lb carcass gain	240lb carcass gain
$20	$72.0	$48.0
$22	$79.2	$52.8
$24	$86.4	$57.6
$26	$93.6	$62.4
$28	$100.8	$67.2
$30	$108.0	$72.0

In fact, I would prefer to consider an annual rate of one beast to 1½ acres to be more realistic for the next few years, which would give a carcass production of 240lb per acre.

Capital expenditure

Taking capital expenditure it seems necessary to have a hypothetical block in mind and I have taken 500 acres as a purely arbitrary size.

On such a block, used for fattening of beef cattle, the following structures and equipment might be needed:

	Est. Cost $	
Yards and tick control facility	3,500	
Cottage	8,000	
Fencing — 4 paddocks + ½ boundary and gates 3½m. @ $400/ml.	1,400	
Water supply and reticulation	2,000	
Small tractor and equipment	2,500	
Farm vehicle	1,000	
Sundry tools and equipment	500	
2 Horses, saddles, etc.	200	
	$19,100	$38 acre

Land Development

Clearing, land preparation, seed, fertilizer and roads @ $50 acre.
Land Cost $???
Stock $???

Note: (a) Influence of size of block on some items of capital cost.
(b) Influence of topography on land development costs.

Nature of enterprise

If fattening only is the chosen enterprise the necessary short-term, recurring stock finance may be obtainable from outside financial sources. This has been assumed and interest on such finance is treated as an operating cost.

However, if a breeding herd is established, the capital requirement is rather more fixed by nature and could be regarded as developmental capital of a particular nature. Financing of other than store stock has not been considered.

Operating costs

No estimates of operating costs are provided due to paucity of data and the absence of an established enterprise pattern and property size.

Major components of property operating costs are —

- Wages
- Vehicle and tractor expenses
- Insurances
- Freight
- Rates
- Accounting and administrative expenses
- Repairs
- Depreciation
- Fertilizer
- Stock costs
- Freight and cartage
- Commission
- Stock levy
- Tickicides
- Veterinary supplies and services
- Interest on purchase price of store stock

Some particular aspects

A high level of both pasture and stock management is called for under intensive production conditions. On a fattening property new stock would be introduced fairly frequently and require careful husbandry in order to get them settled in quickly.

Poisonous plants require rigid control, particularly in view of the introduction of strange animals. Losses of even relatively small numbers of purchased animals make heavy inroads into the margin of the fattener at current prices.

It will be evident that the supply of suitable store animals is likely to be a constant problem, even to the extent that some breeding would have to be considered if widespread development for beef cattle pastures occurs. Only fattening has been considered in this instance. Generally, in highly developed areas fattening is financially more attractive than breeding until the price of stores rises to the extent that the fattener is paying appreciably more per 100lb. for the store than he gets for a finished animal.

Non-irrigated pasture productivity is markedly dependent on natural rainfall and some notes on a preliminary analyses by Mr. B. J. White appear as Appendix 1.

APPENDIX I.

PRELIMINARY RAINFALL ANALYSIS — NERANG RIVER

by

B. J. WHITE, DEPARTMENT OF PRIMARY INDUSTRIES,
DEVELOPMENT PLANNING BRANCH, BRISBANE.

Nerang has an annual rainfall of 58 inches. Rainfall is slightly higher in southern parts of the South Coast, Tallebudgera average for example is 63 inches. The wettest months are January, February, March, each averaging about eight inches. Averages for the driest months of August and September are just over two inches.

Under intensive systems of land use for grazing and fattening on tropical pasture at high stocking rates, reliability of rainfall assumes increasing importance. To estimate the reliability of rainfall in the area, 33 years of monthly rainfall were analysed in relation to the water requirements of pastures. The pasture year chosen was from September through to August the following year. Maximum monthly water requirements used varied from six inches in mid-summer to two inches in winter. Water used is an approximate measure of pasture production. Monthly results have been summarized by grouping into three-month seasons starting September and corresponding to spring, summer, autumn and winter (Table 4).

TABLE 4

Water use of pastures (inches) — Nerang area

ITEM	Sept.-Nov.	Dec.-Feb.	March-May	June-Aug.	Year
Max. Possible	11	18	10	6	45
Water Use —					
Median Water Use (1)	7	14	8	4	34
Mean Rainfall	9.61	20.92	18.48	8.07	58.08
% of Years —					
Limited growth (2)	18%	13%	6%	12%	0
Reasonable growth	72%	81%	60%	72%	100
Maximum growth	10%	6%	34%	16%	0

(1) Value expected in at least 50% of years

(2) Water use less than half maximum.

The results indicate the general reliability of rainfall in all seasons.

The results indicate the general reliability of rainfall in all seasons with the possible exception of the spring period. It should be borne in mind that the above growth reliability figures are relevant to each season. With growth dependent on temperature about half of annual growth occurs in the four months from December to March and low rainfall over this period will generally result in a poor season overall.

As pasture development in this area is of recent origin it is interesting to compare the last few seasons to average. Results are tabled below.

TABLE 5

Water use (inches) 1964-68

YEAR (Sept.-Aug.)	Sept.-Nov.	Dec.-Feb.	March-May	June-Aug.	Year
1964 - 65	8	13	*4*	6	31
1965 - 66	*4*	11	8	4	27
1966 - 67	9	14	10	5	38
1967 - 68	*4*	14	—	—	—

Italics denote limited growth period.

The effect of the 1965 drought is apparent in both 1964-65 and 1965-66 seasons. Over the last 33 years conditions as poor or poorer than 1965-66 have occurred on seven occasions indicating that considerably worse droughts are possible. Better conditions than 1966-67 have only occurred on a few occasions and this should be borne in mind when estimating long term production from tropical pastures.

DISCUSSION

Should we not include interest on development of our property as an operating expense

Mr. Mawson: In the notes as prepared interest on your investment really comes out as the residual after you have found out your operating expenses. You can say you want to make 6% or 10% interest and put it in as a cost if you want to. If you set an arbitrary figure and say I want 10%, put it in as a cost, but unless returns and costs, calculated on this basis, are then equal you will need to make a further calculation to determine actual return to capital.

If you charge it on the stock purchased, why not the development of the property?

Mr. Mawson: Finance for the purchase of store stock is of a short-term nature and is frequently borrowed. This has been assumed in the notes. Property development items are relatively long-term in nature and normally require considerable equity on the part of the developer. In fact, interest on borrowed money irrespective of how it is used is a cost which has to be met, but a developer may be prepared to forgo interest on his own money in the early stages in the expectation of greater benefits at a later stage. The proportions of borrowed money to owner's money could vary considerably according to circumstances.

If you borrow the money to develop your farm you've still got to pay interest?

Mr. Mawson: This is agreed. But you don't necessarily have to get the same return on your own capital. Are people developing this sort of country merely for the return it is giving them now, or are they doing it for capital appreciation, or because they want to live on the coast?

Everyone has a different reason.

Mr. Mawson: That's the reason I left it out. If I put it in I'd have to make an arbitrary decision as to how much you should get. Interest on borrowed capital is definite. In store stock I regard this as a cost, if you borrow it for development it's still a cost which involves a cash payment. But if you put it in out of your own resources, you might be satisfied with a short-term rate less than the current rate of interest.

When you are borrowing on capital expenditure, which isn't an operating cost, and on the cattle, you are borrowing on an operating cost.

Mr. Mawson: Interest is the price which you pay for the use of capital. If the capital is borrowed, interest has to be paid to the lender and this, of course, is an operating cost of the borrower's business. So far as your own capital is concerned, you are the only one who can decide the return that you want. If you decide that you want the borrowing rate of interest on your capital right from the start, then include interest on all capital at that rate in your budget. Sometimes, there is a failure to examine a proposition on a budgetry basis at all.

This is one that breaks a lot of people.

Mr. Mawson: That's right. If you want to go into it purely as a business proposition, you charge the cost of your own management and of your own labour, as well as the desired return to capital. You don't work it our exactly as I've set it out here. It can be worked that way. Any managerial accountant will work it out for you.

Has any one made any money off these pastures yet?

Mr. Roberts: Not many of the pastures have been established long enough yet to be in full production but I know a couple of happy people. Tom Lobban across the road is quite satisfied for the six months he's been here, and I know Arthur Earle at Nerang is very pleased. He's turned off 100 fats so far this year and he's not complaining.

Mr. Redrup: It's very early in our cycle of development. We have some thousands of tropical pastures as seed stands and over the last two or three years we have developed a cattle programme on these pastures since they have got to the size where they could be stocked, the cattle return is beginning to become a larger and larger proportion of total return. At the moment we are wondering whether to close up the pasture for three or four months for seed, because it is getting close to the stage where it is probably better to keep grazing. As the pastures age there is a very fair return to be got. In our case it is very difficult to say what percentage this return represents on capital. I don't think anyone would hazard a guess on this yet because the stands were established for other purposes and they have been amortized from other products. I think that there is money to be got from grazing tropical pastures in this part of the world so long as your total development, cost of land, and cost of development does not exceed $150 per acre. I think you can expect something like an 8% or 9% return on your investment so long as your investment has been wisely applied and the job well done.

Mr. Ritchie: What hasn't been brought out very largely in this, but has become very prominent in areas like Kyogle in Northern N.S.W. and around Cooroy district, is the use of tropical pastures to tackle land which is seriously infested with noxious weeds. In this case we are turning a sort of bleeding financial sore into an asset and in many instances it has not been just a question of making money, but a question of saving severe costs in noxious weed control by establishing tropical pastures.

Comment: Roughly their effort here cost $200 a beast area. Just on figures I've extrapolated I think the net profit for a $50,000 investment would be about $2,800, which would be about 5.6% return to capital. It appears to me that to develop a smaller area and double the seeding and fertilizer rates is an answer to the quick return, v's., the long term return. Would anybody like to comment?

Mr. Roberts: One of the main reasons for the bigger areas is that clearing cost is the greatest variable. This can vary anything from about a bit under $30 an acre to over $50 an acre and the main reason for this variation is the size of

the area you are doing. The bigger the area the more attractive it is to a contractor and the better chance you've got of getting a good rate. You have to increase your fencing because each area has to be fenced off and additional costs like this come in. The opposite course is to poison the timber, not to clear at all; with no cultivation and no clearing costs you'd have an even slower return but a much lower capital outlay.

With regard to the cattle at Parada, Group 3 (in Mr. Mawson's notes), there was one group which put on 1.54lb. a day and the others put on 2.04, apparently at the same time of the year. Could you tell us what was the reason for that difference?

Mr. Mawson: The gain of 1.54lb a day was from 15 beasts on five acres with 300lb. of nitrogen on pure pangola, and that of 2.04lb was from eight head on five acres with 100lb of nitrogen, also on Pangola.

Mr. Neil Young: I think the question was, instead of mechanically clearing the country could you not inject the timber, i.e. use chemicals and then go ahead with the development. Firstly, I've had no experience at all in this area of developing country this way. Against eucalypts and some acacias there's no doubt that this would work and can work very economically, but on many of the species I have seen here we have not got the answer of what chemicals to inject. Until you have got one or at least at the maximum two chemicals that a team could use, and use very effectively, I do not like the idea of going through and only getting half the job done. The other thing I can do is just pose a series of questions for the discussion. When you have an area like this with timber 80 to 90 feet high you've still got to get aircraft to come back annually to top dress with superphosphate. I don't like this and I think you are better to get rid of your timber once and for all. We heard this morning you are using D8's and bigger tractors, and you're using tyned implements for ploughing. I know that tyned implements require high horse power to pull them and of your erosion factors and how the seed sits in your gullies, but there is a lot of experience in the Area 3 brigalow scheme where eucalyptus is a problem (the Dawson River Gum). Where it is pulled and snapped off as this timber has done, big disc ploughs do a much better job than the tyned implement. They are now developing machinery on the principle of flexible discs and these may do a better job than tynes. Stock in many of these areas knock suckers back very effectively, provided you can get the stock on reasonably early. You are then, of course, faced with the problem of whether to put the stock on to keep suckers under control or to let the slow developing perennial pasture species come. Why is not a plant like phasey bean included in the mixture to get a quick growth in the first year. Admittedly you will lose it later, but this may enable you to heavily stock these pastures reasonably quickly. If you do this there is a lot of evidence that you will have no sucker problem. To go even to more ridiculous levels, I pose the question of putting in an upright cowpea. I don't suggest to go as far as mung bean, a smothering thing, but an upright annual growing legume. Finally, to come down to chemicals, once you snap this thing off under the ground there are three ways of putting a chemical on. You can spray it on the leaf that comes up and in most instances you will fail irrespective of what chemical you use. You just can't get enough chemical through the leaf to take out this snapped off butt. You can spray it on the bark if you can get enough bark to spray a chemical on, and in most of the species here 2,4,5T works very well this way. It certainly works well against wattle and often works well against eucalyptus. I wonder if this problem is not more apparent than real as I have looked at some of the tropicals growing particularly well right up to the base of these broken off stumps. I suggest that these stumps are drawing water from a much greater depth than the young developing pasture and I don't see a lot of evi-

dence that they are competing strongly with the pasture. I suggest that in some instances, indeed many instances, you would be better to leave them alone and try and handle them with stock, and if you can't handle them with stock let them get up to 10 or 12 feet high and then inject them.

Mr. Redrup: This touches on the discussion which has been in the air much of the day, as to the technique you use to introduce your seed into the soil. If you accept that the costs on the country that's accessible to drill sowing are worth being borne and we do in our experience because we are grazing at least six months earlier. This counts when you are trying to get cash back quickly. If you drill then there are a variety of things you can introduce into your mixture. *Dolichos lablab* we find is extremely useful so long as it is introduced into the ground somewhere between November and the end of February. Later sowing after the end of February gives you no very great return. But within that period lablab gives you precisely the effect that the speaker was suggesting. Six pounds per acre is ample and gives you a very early grazing. I like to get cattle on within seven or eight weeks of the initial sowing and generally only lablab gives you any sort of bulk in that time. You then get a very effective trampling of the regrowth at the time when it is most susceptible to treading damage. Other things have been used. Mr. Ritchie up at his Talcom property used *Dolichos biflorus* for precisely the same purpose and reports very good success from it. It is a perennial but in many ways acts like an annual in that it develops rapidly. This gives very much more bulk and rapid growth than the desmodiums. Other people have used cowpeas, though they are generally not rigorous enough, under the soil conditions we generally deal with. Lablab is much more tolerant of infertile soils than say the cowpea group. I think we could go a long way further in the use of pioneer crops of this kind, to get the animals on to the ground quicker than we can with perennials.

Will Siratro serve as a nurse crop?

Mr. Redrup: It generally doesn't produce enough bulk in the first season.

If you cut out all the other legumes and just put Siratro in on its own, wouldn't you tend to get a good heavy stand of Siratro?

Mr. Redrup: When you are above rainfalls of 50 inches greenleaf desmodium very rapidly becomes dominant at whatever rates you sow. Generally speaking, money is better spent on greenleaf desmodium than on Siratro, i.e. on any but the very hardest ridge country. The other advantage of the desmodium over Siratro is that its total growing period is substantially longer than Siratro under our conditions.

How many pounds per acre?

Mr. Redrup: I am loath to put in less than 1½lb I have run up as high as 4lb in experimental areas and wish I could afford it all the time. The effect is very great. The higher the rates the greater the seedling density. With Siratro at Samford there are responses to levels up to as high as eight and 10lb, while we have been working at low rates of 1lb and 1½lb per acre.

Mr. Roe: Ray Jones, with rates of Siratro up to 8lb per acre, had a benefit in terms of the rapidity and build up of the pasture. A very important question here is the class of country on which you are making the sowing. On a lot of the old land that has been under development for some years and where the weed problem is great and also the rainfall is a bit lower, say 40 inches, 1lb of greenleaf to the acre I think would be a waste of seed.

Mr. Ritchie: This question of using Siratro as a nurse crop — as far as I was concerned with *Dolichos biflorus* it was largely a question of economics. When you have *Dolichos biflorus* at something like 20 cents per pound and Siratro

around $4 per pound (admittedly Siratro has the long term attribute of perenniality) for the immediate bulk of growth, weed control and general cover, you can get an awful lot of nurse cropping out of *Dolichos biflorus* for what you pay for 1lb or even ½lb of Siratro. I choose *Dolichos biflorus* because I got a wonderfully fast germination, extremely cheaply.

Mr. Kyneur: The question under discussion is early growth of the pasture to combat sucker regrowth. One way to do this would be to stimulate the grass growth earlier with nitrogen fertilizer.

Mr. Young: Growth of the box *Tristania,* which I've measured as 11ft in eight months, would take a lot of suppression by just straight out grass.

I thought the argument was that if the animals can get on quickly enough they trample the suckers down?

Mr. Young: A few pounds of a pulse legume would be cheaper than the amount of nitrogen needed for vigorous grass growth.

Mr. Redrup: Use of nitrogen at establishment would have the objective of getting the animals on earlier, partly for the sucker control and partly for getting a cash flow through quicker. Our general experience has not been very satisfactory. With large paddocks with water supplies tending to be spread, we find it very hard to recover applied nitrogen economically. We suspect that the addition of nitrogen even at rates as low as 50lb per acre at sowing does tend to give us in the following summer a weaker legume stand.

In open timbered country where Siratro has germinated well when broadcast without disturbing the soil, will greenleaf desmodium do as well under the same conditions?

Mr. Redrup: From general experience it is hard to establish anything but Siratro without stirring the soil, and even Siratro establishes far less vigorously under those conditions.

Mr. D. Shaw: It doesn't matter if planes have to fly at 200 or 300 feet. Somebody is suggesting that you spend up to $20 an acre to clear the timber so they can fly a bit lower. Your pilot can put your seed and fertilizer on at 300ft if he has to.

Mr. Redrup: This country has very heavy physical relief anyway.

Mr. Shaw: If you are willing to spend $20 an acre to get the timber down so you can fly a bit lower, that is okay, but if the pilot is any good he can put it on from over the tops of the timber.

Mr. Redrup: All we can report, sir, is that they certainly do not like it. They make that very plain.

Comment: They prefer to operate from a height of 100-150 feet irrespective of whether there is timber or not. They do not like to spread super at a height of more than 100-150 feet. Higher than that they get too much drift, and below that they don't get sufficient spread.

Mr. Redrup: If they have the hills and valleys plus the trees they tend to object. Whether this is valid or not, I don't know. We are very interested in what role the timbered pastures might be expected to play in beef production, particularly perhaps vealer production which is attracting most operators down here; this applies to the two classes of country. The hilly country on which we spent most of today and the rather large areas of alluvial flats that we referred to earlier as meadow soil. If we were prepared to modify our sowing times, our grazing pattern and sharply increase our fertilizer levels could we expect an early building of Ladino or lucerne into these hills. Also what is the situation on the flat alluvial country of much higher fertility status?

Comment: You are likely to get a faster build up of nitrogen, faster than you'd get on the somewhat slower establishment of some of the tropicals, especially in the winter period. This may give you increased grass production in the coming spring, perhaps faster establishment in general in the grasses. Perhaps also it could lead, certainly in the first year if not in later years, to greater winter production from these pastures, to fill in the gap we know exists at that time.

Mr. Harrison: It appears to be working quite well on the Coast but I am in 32 inches rainfall on a heavy clay soil which is different from coastal ones. Dr. Davies, would you like to say something on this?

Dr. Davies: The factors that are of greatest importance in this situation are two. First there is the frost factor. If you are going to use your flats to the best advantage because of the presence of frosts there, then my preferred legume is white clover. If you are contemplating on these hillsides a combination of white clover and the tropical legumes, I think you should know that Raymond Jones at Samford has shown quite conclusively in the last three years the two desmodiums do not combine well with white clover. In fact, you cannot establish or maintain white clover in the presence of *Desmodium uncinatum* or *Desmodium intortum*, but you can with Siratro. I would rather have country with flats and hills where temperate species could be grown on the flats and tropical species on the hills. This situation could change with the new frost tolerant setarias and better frost tolerance in Siratro.

Comment: There are situations where white clover grows very well without irrigation. In other parts of the countryside under the same rainfall but on different soil types you might get one year out of it; you might be lucky if you get two. There seems to be some soil factor involved. In some soils clover does well. In others it does not.

Mr. Redrup cannot hold his Ladino clover on the flat.

Mr. O'Brien: From my experiences down on the Clarence and from what I've seen at Samford, the white clover which is present there after four or five years is naturalized white clover, not Ladino, and is a high seeding, weakly perennial strain. It regenerates from seed, thickening up the stands on a yearly basis, but any original Ladino plant or any additional Ladino strain is only there in the stand from crossing. If we wish to sow white clover in this type of country, we should be talking in terms of the high seeding, naturalized white clover strain for autumn, winter and spring production for regeneration. It will go into country with lower rates of fertilizer than Ladino. There are many advantages to be had from naturalized white clover which is already in the areas.

What do you know of these naturally high seeding ones?

Mr. O'Brien: I would say that there is undoubtedly room for the incorporation of Ladino in it, so that in an area where natural white clover has existed it might pay you to oversow Ladino. In areas where you haven't got the white clover you are supplying sufficiently high levels of phosphate for white clover to establish. Put the naturalized white clover in until such time as the fertility level builds up to sustain Ladino, and then pop in your Ladino.

Dr. Davies: There is not the slightest bit of evidence that Ladino requires any higher fertility than the little naturalized one we've got.

Mr. O'Brien: This is unpublished data from white clover strain trials on the Clarence which have substantiated that this natural white clover will exist at lower fertility levels than the Ladino, and it will still produce.

Comment: A small amount of green fodder goes a long way in winter. I'd like to support that in the area I'm working in, which is between Warwick and Stan-

thorpe and mostly 30-inch rainfall, most of the Ladino has died out and what we are left with is either natural white or New Zealand white. Most of the Ladino has gone. I don't know if it's got anything to do with fertility. I think it's got a lot to do with seeding ability. White clover is acting more like an annual than a perennial.

Of the temperate grasses the only ones we hold much promise for are Demeter fescue and Currie cocksfoot. Another question — why white clover? Why not use Hunter River lucerne?

Mr. Luck: There has been much talk about temperate species not persisting, and Ladino in particular, but I think this possibly occurs more in the drier areas far from the coast. It has been suggested that in higher rainfall it does not persist for more than four or five years. I don't agree. There are farms where it does persist and there are farms where for some possible soil fertility reason it does not persist. But I feel the greatest reason for white clover, particularly Ladino, thinning out in the high rainfall areas is the ingress of inferior grasses such as carpet grass. There can still be quite a lot of white clover there but there's a lot of carpet grass after four or five years. It might be more economical to plough out and replant with better grasses than to have the combination of clover and carpet grass, which is particularly hard to manage in the autumn period when the carpet grass keeps rushing to seed. I would still plug for Ladino on the higher rainfall areas but with New Zealand white you get better seeding.

Dr. Davies has hit the nail on the head with the recommendation of clover on the flats and tropicals on the hillsides, and there is room for both. The problem as I see it for lucerne is the acidity of these soils. These soils may go down to pH 3.5. If this is the case I think we can forget about lucerne. Even with white clover you would be struggling on the more acid soils. I think the combination of tropicals with clover is alright. I beg to differ with Dr. Davies on this one as we have stands of desmodium and clover persisting. I don't know the reason. This is under conditions of fairly heavy stocking and also with the equivalent of continuous grazing where your tropical legumes never really get away and smother clover, and so clover has every opportunity to come. You might not think there is much clover in the summer but it generally comes each winter and spring.

PROPERTY OF EBAN BROS., CURRUMBIN CREEK

by

A. K. & E. R. EBAN

PROPERTY DETAILS

The area of this property is 340 acres and consists of two separate but adjoining farms. One farm of 155 acres was purchased in September, 1966 and the other of 185 acres, in March, 1968. The present vegetation consists of some 90 acres of uncleared forest, 110 acres of cleared natural grassland, 80 acres of improved sown pasture and 60 acres of salt swamp.

The topography varies widely with approximately 230 acres of flats, the remaining 110 acres ranging from gently undulating to steep hilly country. The flats include 60 acres of peat loam and 170 acres of alluvial soils. On the elevated areas (110 acres) the soils are loamy.

The mean annual rainfall is about 70 inches per year. The flats are subject to frost (up to 10 per winter) but the hills are generally frost free.

PRESENT LAND USE

Our aim is to produce whole milk as well as vealers from cull dairy cows. The dairy operation has just commenced with the purchase of the 185 acre farm and dairy herd. At the present time the property is carrying 130 head of stock.

Existing pasture includes 15 acres irrigated, 25 acres tropical pasture and 25 acres of mixed pasture with both temperate and tropical species. Details of some of the existing pastures are given in Table 6.

TABLE 6

Pasture planting details, Eban Bros.

Pasture No. 1 (Planted November, 1966)

	lb /ac.	Estimated Cost/ac.
(a) Land clearing		$12.00
(b) Seedbed preparation — Rotary hoe (3), moulboard plough (1), disc harrow (3), harrow (4), roll (2), plant and fertilize (1)		$23.00
(c) Pasture Mixture —		
Silverleaf desmodium	2	
Greenleaf desmodium	1	
Ladino clover	1	
Nandi setaria	2½	
Kazungula setaria	½	
Scrobic paspalum	3	
		$45.00 ($25.00)*
(d) Establishment fertilizer — Mo super 12 @ 2½ cwt /ac.		$ 4.00
Total cost/ac.		$84.00
(e) Maintenance fertilizer — 4 cwt./ac. Mo super 12 — February, 1967; 3 cwt./ac. super — June, 1967; 4 cwt./ac. dolomite — September, 1967		

Pasture No. 2 (Planted January, 1968)

	lb /ac.	Estimated Cost/ac.
(a) Seedbed preparation — Rotary hoe (4), harrow (3), roll (2), level (1), plant and fertilizer (1)		$17.50
(b) Pasture mixture —		
Silverleaf desmodium	2	
Greenleaf desmodium	1	
Ladino clover (white)	1¾	
Louisiana clover (white)	¾	
Scrobic paspalum	3	
Hartley plicatulum	3	
Priebe prairie	4	
K.V. Rye	3	
Wimmera Rye	3	
		$25.00
(c) Establishment fertilizer — Mo super 12 @ 2 cwt /ac. Dolomite @ 1 cwt /ac.		$ 4.00
Total cost/ac.		$46.50
(d) Maintenance fertilizer — Mo super 12 @ 3½ cwt /ac. — April, 1968		

* Based on January, 1968 prices.

In addition to these pastures we have planted 15 acres of oats, rye grass and clover for forage harvesting for the winter months.

Pasture No. 3 (Planted February, 1968)

	Estimated Cost/ac.
(a) Clearing — Clear (Cat. D6), windrow, burn, root, rake, stick-pick	$38.00
(b) Draining	$15.00
(c) Seedbed preparation (including landing) — Little giant disc (1), rotary hoe (4), disc plough (2), tyne cultivate (1), landing grader (1), harrow (2), level (1), roll (2), plant and fertilizer (1)	$28.00
(d) Pasture mixture — As for No. 2 but including ¾lb Kazungula setaria and replacing Wimmera Rye with H.I. Rye	$27.00
(e) Establishment fertilizer as for No. 2	$ 4.00
Total cost/ac	$112.00
(f) Maintenance fertilizer as for No. 2	

PASTURE INSPECTION

Three pastures are to be inspected. These include a tropical pasture mixture planted in November, 1966 and two mixed pastures of tropical and temperate species planted in early 1968. A summary of clearing, land preparation, seeding and fertilizer rates and estimated costs are shown in Table 6.

In pastures mixture No. 1 rotational grazing at 14-20 day intervals is practised. Our aim with this system is to keep the setaria in blade. Occasional slashing to remove excessive setaria seed heads is carried out. With this management programme no weed problems have been experienced.

For six months from October, 1967 to March, 1968 two adult beasts per acre were grazed on this pasture. The cows milked well provided the pasture was kept short and nitrogen maintained at a high level.

Our experience has been that the rapid cycle of summer growth on the fertile river flats makes the legumes incompatible with setaria.

DISCUSSION

It seems that good ground preparation and provision of adequate drainage is necessary for establishment of temperate species.

Mr. Eban: We encountered a serious problem in this country in that ground which appeared to be reasonably well drained in fact remained under several inches of water for several weeks during and following the unduly heavy rainfall of January this year. In a way this has taught us a valuable lesson from which we now pay great attention to ground preparation and drainage in laying down new pastures. It appears that tropical legumes are slightly less tolerant of wet conditions than white clover but they are certainly not as tolerant as setaria which remains very persistent.

Is rotational grazing helping your feed surplus problem?

Mr. Eban: Yes. But really the only method we have of dealing with surplus grass is to slash it. This is a chore, certainly. We find that with strip grazing we can see exactly the state of each pasture all the time, i.e. what there is coming on, what is ready for grazing and what is surplus. In warm humid weather if the cattle can't handle the growth we may simply lift it off with a forage chopper. We are therefore using strip grazing as a means of controlling these

pastures since our early experience with set grazing led to insufficient control in order to maintain the legume component. Perhaps we should be looking for a grass that is a little more easy to handle on these situations.

We also have an area of Kikuyu which we thought we had eradicated, but of course this is not so easily done. The Kikuyu returned during the autumn to the extent that the other grasses and white clover could not be maintained, even following careful management. I feel that on these heavy valley-bottom soils, which are not high in nitrogen, that Kikuyu is a weed. This would not be so on soils with a high level of nitrogen. Here we find its nitrogen requirements are a great deal higher than is required for setaria to achieve a given amount of fodder. It is even more difficult to hold legumes with Kikuyu than with setaria.

Could you attribute this difficulty to the cutting and removal of herbage from the paddock?

Mr. Eban: This of course is something we endeavour to avoid but it is the lesser of two evils. It is better to have a pasture which is slightly deficient in potash than virtually no pasture at all. Here we aim to slash only after each grazing and perhaps 30% of the herbage returns to where it was grown, which we feel is good. It was necessary only on two occasions to remove the material from the paddock.

Are there any indications of what legumes you might be able to hold in this sward with setaria?

Mr. Eban: It appears that the desmodiums will only be held here with difficulty. They have performed very well throughout the season and it was not uncommon to see the greenleaf right on top of the setaria, which we thought was good, but later on, because of the tremendous growth rate of the setaria, it is going to be difficult for any legume under these circumstances.

When the nitrogen status of the soil is raised Kikuyu could be one of the highest producing grasses. It will stand up to wet and dry, hot and cold.

Mr. Eban: This is a very interesting point. I can only comment from our own observations of the two grasses growing side by side. Kikuyu demands higher soil fertility for a given amount of fodder produced. The choice may rest in the relative values of each as a feed in terms of digestibility and capacity to produce milk.

Pangola has a high proportion of stem but yet it is a highly palatable grass.

Mr. Eban: This is true. In the long run it is a question of how much milk per acre or beef per acre is produced for the amount spent and this is something we still have to find out. I'm very impressed with Pangola, in fact this coming season we will be planting a great deal of this grass and we believe it will be more useful to us under these conditions than setaria.

Maybe Kikuyu is the same as Pangola?

Mr. Eban: Up to this point we have been planting Kangaroo Valley perennial rye-grass and Wimmera rye-grass. In the later plantings we have been using New Zealand short rotation Hl and Italian rye and we would like some guidance on these things.

Mr. Roe: With respect to slashing these pastures and how it might affect the amount of legume you've got, you mentioned that you use the slasher very frequently and that, at least once, you slashed it very close.

Recently in a very detailed experiment at the C.S.I.R.O. Pasture Research Station at Samford, the effect of several management treatments was studied. These included one of periodic grazing at 6-week intervals in summer and then the uneaten surplus left on the pasture mowed to a height of 2 inches. At the end of three years none of the legumes were left and these involved Siratro,

Desmodium uncinatum and glycine all with Rhodes grass. At the end of 3 years a control treatment to which nothing had been done (it was just left there to accumulate all the rubbish you could imagine), showed an improved content of all the legumes. It may well be that to attempt to produce good quality grazing from the grass is incompatible with the idea of maintaining legumes.

Mr. Eban: Yes, I think this is true but the point is that I suppose 80% of our dry matter comes from the grass.

Mr. Roe: Yes, well the point I am trying to make is that perhaps you are sailing into the wind too much to expect the legumes you have got here, at least the tropicals, to give you the nitrogen you want.
It has often been observed that if you've got a site where frosts are bad in winter, this makes it a pretty tough environment for these particular tropical legumes so that again you're sailing into the wind when you are trying to maintain legumes with this grass in this site.

Do you think straight grass plus fertilizer nitrogen is better than grass plus poor legume?

Mr. Eban: I think it is the protein that caused this increase in milk production. It could not have been the greater intake of feed. It takes especially high protein quality to produce 3 or 4 gallons of milk per cow per day.

Mr. Redrup: Mr. Eban has been emphasising the high proteinaceous quality of the short blade grass when it is managed in this very severe fashion. However, this is not always possible as exemplified by the fact that he has had to slash and remove the growth occasionally. In this situation the protein content of the grass would then be well below the levels considered satisfactory. Where it is possible to hold a legume in the system it is not so important to meet this criterion of short, high quality grass since much of the animal's protein intake is derived directly from the legumes themselves.

Comment: We've almost given up trying to grow legumes in that country anyway and we've definitely given up trying to grow them with setaria. In fact we've given up trying to grow anything with setaria. We have swung very definitely to the use of nitrogen on setaria. We've got a very good way of filling this feed gap because invariably you come out of winter with a bit of sub-soil moisture even if you don't pick up the storm you need. It takes 10 points to wash the fertilizer in and you're away.
Secondly, we've never tried to grow white clover with a tropical grass like this. We put our white clover into paspalum—a less vigorous grass—and we can hold it for five years but we won't hold it indefinitely and then we use a lot of oats and winter forage is grown in a cultivated area. I don't see any cultivation around your area.

Mr. Eban: No. Well there is in fact over near the creek—we have a great deal on the other part that is actually out of sight—oats and clover.

Forage forms quite an important part of your feed sequence.

Mr. Eban: Certainly, and our idea here is to sow oats, rye grass and clover. You get a few grazings of oats and then you have a rye grass/clover pasture that performs well right throughout the winter and spring.

What do you think of the idea of using straight grass plus nitrogen here on the flats and putting the legume mixtures up on the hillside for dry stock?

Mr. Eban: This is good. It does seem that the hills are ideally suited to these tropical legumes because in this situation you really want a high protein conservation fodder for drought and winter. It seems to us that it is going to be very difficult to hold useful amounts of legume in pasture under this low

land situation although we have been experimenting this season with a different mixture. There instead of planting setaria we planted scrobic, which of course is very compatible with these legumes, and also Hartley plicatulum which is also a very easily managed grass.

Here we have included the desmodiums and white clover and also rye grass and we think although this will have a lower total productivity it is well worth examining. This, again, we will try to farm as a year-round total pasture, assuming we can hold white clover throughout the season and each winter we would regenerate it with extra white clover and rye grass through sod seeding.

I believe there is a lot of interest in mixing cattle and sheep in New Zealand. Have you had any experience in this? Have you ever used the sheep to follow the cattle and clean up the rubbish?

Mr. Eban: I think you will find here that sheep are pretty selective grazers and I think under this very high stocking rate we have the problem, with high rates of stocking, of cleaning up fouled pastures and really I think the slasher is the only system.

Mr. Bryan: This whole system of slashing is fairly obvious. It is one of the factors in putting back tropical legumes. If you use crash grazing you can knock the tropical legumes out because you destroy so much of the stem and it gets back to very dormant buds at the base of the plant, whereas if you graze more lightly the animals simply brouse the top and you are still left with a lot of very active buds and you get very rapid regrowth.

Mr. Eban: Yes, I think this is true. This is one of the penalties you pay for controlling your grass and it simply comes back to the fact that the tropical legumes which have a slower growth rate and thus are not compatible with setaria under this environment. I thoroughly agree here but it's a question of the best utilization of the pastures.

Mr. Luck: This is a point that probably hinges on what stocking rate you are to get out of these pastures. If you are prepared to settle for a lower stocking rate per acre, something like 1½ acres per cow, then tropicals are most useful. We have found that tropical legumes are reasonably compatible with setaria, particularly Nandi setaria which is slower growing and probably more compatible with legumes than Kazengulu setaria. A great deal of the feed is probably coming from the tropical legumes which can provide the bulk of the protein as Mr. Redrup suggested. There are a lot of people who say tropical legumes or any legume in our environment, clover as well, will not put enough nitrogen into the grass. Well this is quite true. They won't put enough nitrogen in to make the grass grow at the rate it is capable of growing and I think a lot of people also forget that the legume itself is a cow feed and probably a much better quality one than the grass anyway, particularly clover which has a much higher digestibility than any of our tropical grasses. I think there are two types of farming you can go for. You can go for intensive stocking methods. You'll need grasses and you'll need nitrogen. On smaller farms you'll have to do this but if you've got enough acreage you can go for legume pastures including clover on the flats and sub-tropical legume-grass pastures on the tops of the hills and you'll get I think, quite adequate milk production. But you don't get the carrying capacity per acre. This has been proved with some of the biggest suppliers in the Wide Bay region.

Mr. Eban: This is a very interesting comment because we are after quality forage and I think we were consciously looking for this solution when we planted less vigorous grasses in our newer plantings and this should give us a legume dominant pasture.

Mr. Redrup: This is thoroughly confirmed by the experience of our seed stands. We began to introduce cattle as an important factor in aiding seed production because we got worried about what was happening to the seed stand in the absence of grazing. Thereafter we established each of our grass stands with a tropical legume. Now the very interesting part of this exercise has been that the grasses like *Paspalum wetsteinii* and *Paspalum plicatulum* have been easily the most productive animal pastures, looked at as pastures rather than as seed stands. We have held pastures of silverleaf and greenleaf desmodium with plicatulum and wetsteinii for 4-5 years now, and having settled for one breeding cow per acre as the average stocking rate on these pastures there seems to be no change between the proportion of grasses and legumes. This confirms, I think, what Mr. Luck said, in that if you are prepared to settle for the type of stocking rate which will maintain the balance between these lower performance grasses and legumes then we can look for stable management of an association of the tropical legumes.

FUTURE DEVELOPMENT PROGRAMME

It is our intention to continue planting the remainder of the farm in the next two years with improved tropical pasture. Our aim is to provide 95% of the dairy herds' feed requirements from rain grown pasture without the necessity for cropping.

The pastures on the 230 acres of moist flats will form the basis of the feed programme. On completion, 180 acres of these swamp flats will have been drained, formed into lands and planted to pasture based on pangola grass, scrobic and white clover. We intend to rotationally graze the flats from about November through to April or May. These pastures will then be slashed and sod-seeded with rye grass and clover for winter/spring grazing from July to November.

The higher flats are to be planted with scrobic, desmodium and white clover. These will be grazed from about November until they become frosted in winter.

Our aim is to plant the relatively frost free hills to greenleaf desmodium, stylo, Siratro and molasses grass with lotononis and Pangola grass in the gullies. These hill pastures will be reserved for grazing during the wet months (usually January and February). Summer grazing of this area will be restricted so that a bulk feed will be available to the whole herd during the May to August period.

MISCELLANEOUS INFORMATION

In December, 1967 we attempted to ensile excess tropical pasture growth. A 25 ton stack of wilted silage (65% moisture) was ensiled in a plastic vacuum pack. This has stored so far, without any deterioration.

For stock control on the property we use suspension fences for all boundary and major subdivisional fences. Subdivision within the major paddocks consists of single wire (12½ gauge) permanent electric fencing with standards at 70 feet intervals. This allows high stocking and rotational grazing to be carried out effectively at low capital costs for fencing.

PROPERTY DEVELOPMENT ON "REIDVALE", INGLESIDE

by
R. G. GIBSON

PROPERTY DETAILS

The property "Reidvale" was purchased three years ago. Prior to this I was dairy farming at Alstonville in Northern New South Wales. My intention is to develop "Reidvale" (380 acres) as a whole milk dairy farm. Bulk whole milk is supplied to the South Coast Co-operative Dairy Association Limited in Southport from a mixed dairy herd averaging about 45 milkers.

Rainfall on the property is 70 inches per year. Good frosts can occur in the winter but this varies from year to year. In some years only the low lying areas are frosted.

The property consists of about 70 acres of flat country, 150 acres undulating, 140 acres reasonably steep hills and 20 acres too steep to develop.

When the property was purchased no pasture improvements existed. Up to the present time some 100 acres have been developed with pastures and crops. This includes —

50 acres tropical grass/legume pasture
20 acres Kikuyu pasture
10 acres oats and clover
15 acres vetch and clover
10 acres *Dolichos lablab*

The remainder of the property includes about 100 acres of carpet grass (*Axonopus* spp.) dominant pasture and 180 acres of steep and/or timbered country not yet developed. The latter 180 acres is not utilized at present.

Total stock on the farm has been increased from 83 to 130. The present stocking rate over the utilized portion of the farm is approximately one adult beast per $1\frac{1}{2}$ acres. This stocking rate has proved insufficient to utilize the feed produced under the present programme. As a result a considerable summer and autumn pasture surplus exists. However, I prefer this situation to one where there is over stocking.

THE FEEDING PROGRAMME

Figure 4 indicates the types of pasture and crops used to provide grazing throughout the season. The normal period of grazing is also indicated.

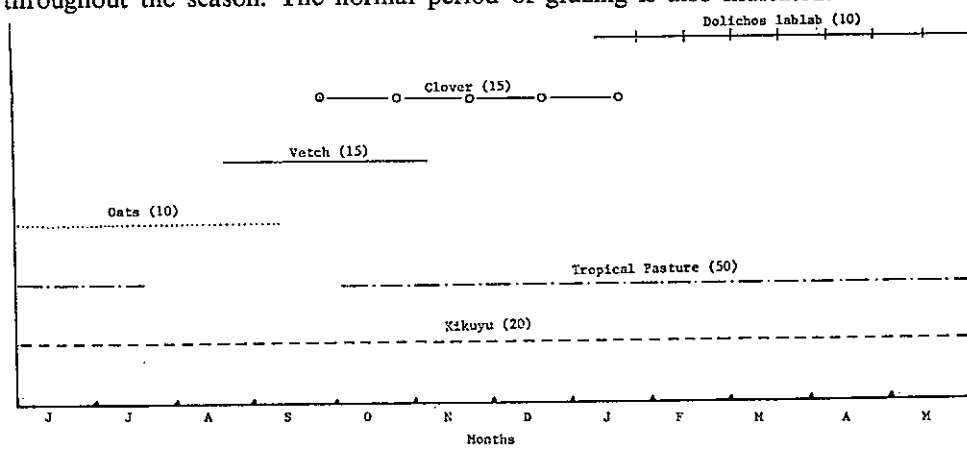

FIGURE 4
Pasture and crop availability, R. G. Gibson, Ingleside.

The 50 acres of tropical grass/legume pasture forms the basis of the feeding programme. This pasture is rotationally grazed (7 hours per day) throughout the year except for about two months in late winter. Animals are removed from each paddock when milk production begins to drop. Weeds are controlled by slashing and, where necessary, hormone sprays.

Kikuyu paddocks (20 acres) are used for night grazing and are rotationally grazed throughout the year. To supply additional winter/spring feed about 10 acres of oats and clovers and 15 acres of sod seeded vetch and clovers are planted about April. In both cases a mixture of ladino white and red clover is used. The oats provide supplementary grazing during the mid- to late-winter period and the vetch in the late-winter spring period. Clover sown with the oats and vetch provides good grazing in the spring and early summer. Depending on seasonal conditions this clover may remain productive throughout the summer months. Oats are planted on a fully prepared seedbed but the vetch is sod seeded directly into existing carpet grass and kikuyu pasture after heavy grazing or slashing. Details of the planting rates, fertilizers, land preparation and establishment costs are shown in Table 7.

Oats, vetch and clovers are rotationally grazed in strips using an electric fence.

Carpet grass areas sod seeded with vetch for three successive years are now over 80% kikuyu grass.

Dolichos lablab is planted with a view of supplying additional high quality late summer/autumn feed as well as acting as a pre-crop for carpet grass land to be planted with tropical pasture.

The use of this planned feeding programme outlined was largely responsible for the 1967 farm milk production to be about 45% higher than that of the 1966 year.

PASTURE INSPECTIONS

The tropical pastures to be inspected represent two pastures planted in 1966 (16 months old) and one pasture sown in December, 1967 (4 months old). The details of seeds, fertilizers, land preparation and costs are shown in Table 7.

TABLE 7

Pasture and Crop planting details, "Reidvale"

Pasture No. 1 (8 ac Planted December, 1966)

		Estimated Cost/ac
(a) Seedbed preparation — Ripping (2), moulboard plough (1), disc harrow (2), tyne cultivate (2), plant and fertilize (1)		$17.00
(b) Pasture mixture —	lb /ac	
Clarence glycine	1½	
Cooper glycine	1½	
Silverleaf desmodium	½	
Greenleaf desmodium	½	
Kazungula setaria	1	
Molasses grass	1	
		$23.00 ($12.50)*
(c) Establishment fertilizer — Mo super 12 @ 4 cwt /ac		$ 6.00
Total cost/ac		$46.00

(d) Maintenance fertilizer — Mo super 12 @ 2 cwt /ac /year (September, 1967)

Pasture No. 2 (2 ac Planted December, 1966)

	lb /ac	Estimated Cost/ac.
(a) Seedbed preparation — as for No. 1		$17.00
(b) Pasture mixture —		
Cooper glycine	2	
Clarence glycine	2	
Kazungula setaria	1	
		$15.00 ($ 7.00)*
(c) Establishment fertilizer — as for No. 1		$ 6.00
Total cost/ac.		$38.00
(d) Maintenance fertilizer — as for No. 1		

* Based on January, 1968 prices.

Pasture No. 3 (25 ac Planted December, 1967)

	lb /ac	Estimated Cost/ac
(a) Clearing		$24.00
(b) Seedbed preparation —		
Chisel plough (5), baby giant disc (2), plant & fertilize (1)		$19.00
(c) Pasture mixture —		
Greenleaf desmodium	1	
Silverleaf desmodium	1	
Siratro	1	
Clarence glycine	1	
Tinaroo glycine	1	
Ladino clover	1	
Kazungula setaria	1	
Nandi setaria	1	
		$24.00
(d) Establishment fertilizer —		
Mo super 12 @ 4 cwt /ac		$ 6.00
Total cost/ac		$73.00

Sod Seeded Vetch and Clovers (Planted March, 1968)

	Estimated Cost/ac
Golden tares (20 lb /ac)	$ 3.50
Ladino and Red Clover (1 lb /ac each)	$ 2.00
Sod seeding	$ 2.50
Fertilizer (Mo super 12 @ 2 cwt /ac)	$ 3.00
Total cost/ac	$11.00

Oats and Clovers (Planted March - April, 1968)

	Cost/ac
(a) Seedbed preparation —	
Baby giant discs (3), sod seed and fertilize (1)	$13.50
(b) Seed —	
Benton Oats @ 50 lb /ac	$ 4.50
Ladino and Red Clover @ 1 lb /ac each	$ 2.00
(c) Fertilizer —	
19:12:0 @ 2 cwt /ac	$ 7.50
Total cost/ac	$27.50

FUTURE DEVELOPMENT

It is my intention to develop the whole farm so that at least 200 dairy cows can be supported. The objective is to produce cheap whole milk from rain grown improved pastures. Some 200 acres of land remain to be cleared. Contract rates for clearing, seedbed preparation and planting (excluding seed and fertilizer) would amount to about $36 per acre or a total of $7,200.00. I consider it an economic proposition to do this work myself. I have purchased a "crawler" tractor with blade and this will be sold when the work is completed.

DISCUSSION

With regard to your tropical legumes, how far is the frost likely to cause frosting on the hill?

Mr. Gibson: I have seen frost from one tree line to the other, but this was exceptional. Normally they would only be light here. I received quite a bit of advice on this for my first pasture on the hill opposite last year on how far I should graze the crop down and still protect the legume. I was told if I left a reasonable amount of grass on top it would help it. It was about seven feet high when I commenced grazing it in autumn. They did knock a lot of it down but they grazed it right through the winter and there was still straw roughly three feet high at the end of the winter. Although I did not have a frost to test it I don't think a frost would have hurt it.

This year I have still about 30 acres I haven't touched and the stock won't be increased. When I put them on to that, they are not going to eat the pasture they are on now. Furthermore, I have 10 acres of oats, 15 acres of vetches — they've got to get through all this and that is still followed by double that amount of clover.

Mr. Ritchie: There is a suggestion that a good deal of this grass is wasted. I feel particularly when a pasture is being established and getting away in its first year, I like the idea of seeing a certain amount of grass being trampled down. It has been my experience that if you want to get good and steady growth from these legumes you want the runners pegged down as much as possible into the soil from their nodes, you want any regrowth to come from a large meshwork of runners rather than from the crown. Now I think theoretically the ideal situation for these runners to be pegged down is for them to be held firmly in contact with a nice layer of organic matter. This forms an ideal protective mechanism for the runners. They are laid down under this sort of dried dead grass and the new shoots come up through it, but the runners are then protected from actual grazing. This I should think give the pasture, the legumes particularly, a good chance to get matted down and help their persistence of production enormously.

Mr. Redrup: This works very well in a legume dominant situation. Where there is a tendency to grass dominance the recovery of the pasture is poor. Management should be aimed to promote legume dominance.

Mr. Gibson: I'd like to take this a little further. I might be a little bit different to a lot of other farmers, but it is my aim to get the pastures down on as many acres as I can before I run out of spirit. When I came up here I reckoned I had about 15 years hard work left and I gave up a pretty easy type of farming in moving from Lismore. It's my aim to get the pastures down, but I am not a financial tycoon. I have to spend money wisely, but once I get them down I'll consider then whether I can make more out of them. In the meantime, I know I am not going to starve. On our present milk market here, if you work it the way I am working it, you can produce the cheapest milk that's possible and make quite a good living.

On this property do they graze the tropical pasture each night?

Mr. Gibson: Not at this stage. They graze the Kikuyu paddocks mainly and possibly later on they'll be going to the tropicals. Like most dairy herds at night they are kept in paddocks close by the house and whereas you give them about 7 hours a day of high class pasture you expect them to milk the same on about 12 hours at night time on an inferior pasture.

Do all these Kikuyu pastures get fertilizer at some stage or another?

Mr. Gibson: Very often the Kikuyu areas are the ones that get the vetches in them in rotation. Apart from that, if I happen to get short of feed as I did in the drought year, I'll apply some sulphate of ammonia, just for that particular time. From what I can judge from top-dressing with sulphate of ammonia, and this was pointed out to me by the boys at Wollongbar, unless you are going to utilize that feed and not waste any other feed, which is pretty hard for me, then it is uneconomical. Consequently I haven't done much at all.

You made a comment before that you thought your dairy production was fairly economical. Could you give us some indication as to how many gallons of milk you are getting per year?

Mr. Gibson: Last year it was over 20 thousand gallons of milk from 65 cows. My herd is not a top class herd. When I took it on it left a lot to be desired. I've improved it a lot and would like to say I still have a long way to go in improving the herd.

How was the seed sown, on top of the ground?

Mr. Gibson: I wouldn't throw any seed on top of the ground if I could put it in by any other means. I have known the winning vetch pasture on the Northern Rivers one year was won by a pasture planted this way, and I know that when the judges came to judge the winning pasture that they were saying to each other, we don't like doing this because every Tom, Dick and Harry is going to run home and start throwing seed about. This can happen possibly one year in ten. You throw it out, you get rain that night and rain for the following week and you get a good stand. If you don't get the rain, then you don't get the crop.

Has anyone tried to develop matt grass simply by fertilizing it? Could it be a cheap stop-gap method of improvement by using super straight on to matt grass pastures — and what about natural white clover?

Mr. Gibson: There is a naturalized small white clover. I don't intend to class this as a clover, to be honest, when you compare it with ladino or red. There is not much to be gained from fertilizing matt grass without introducing a legume as well.

Mr. Lemon: I think you would find it is in many cases a far better clover than ladino or red clover. I think that a lot of these things are acclimatized to their own areas, and the one that we have here seems to out-perform either ladino or red clover in that it stands up to harder grazing; some we have simply just fertilized is furnishing a lot of feed all year round.

Mr. Gibson: If you are going to apply fertilizer I think you should put it on a pasture that will really respond to it. I have taken the sludge from the dairy and spread it over an area of matt grass and clover and paspalum appear in very quick time so that would bear out your idea.

Mr. Lemon: I don't get as much rainfall as you do, but I like to think that I have a larger area perhaps, not doing quite as well as your smaller area. I think you make better use of the amount of rain that does fall on your place. After all, if you don't get sufficient rain your improved pasture will only carry what the water supply will allow.

Dr. Davies: These last two days have been of great interest indeed to me. As one of the Cunningham Lab. boys who have been trying to develop these new plants for use, it has been extremely interesting to see that they are now being used by the farmer and the grazier. If I may say so, they are being used with extraordinary intelligence and skill. I notice that most of them say they don't know, but the fact of the matter is that they are using these plants and in most instances they are using them in the right place and they are also showing up some of the faults that are still attached to these plants. We, as research workers, know that none of the plants that have been released are by any means perfect. But I think if we cast our minds back, 15 years ago at least, we have given to the grazier a series of plants that he can exploit.

Yesterday, we saw an example of 150 acres of green timber which had been knocked over and certainly it was only in the first few weeks of the pasture, but clearly those plants had established and looked, arguing from what we saw later, as if they were going to take over the 150 acres very effectively. We know that tropical grasses and tropical legumes are not cold resistant enough; we have known this from the beginning of our work, but we felt that the release of these plants into the hands of the farmers was still very much worthwhile and would give perhaps another 10 or 15 years for research people to find solutions to this frost problem. At least in one instance we have got it; in the case of setaria.

Now, the increase in production that is possible through the summer because of these plants I think is going to change quite a lot the situation that our coastal country has been subject to. You will note, I think, that everyone is particularly acid about the matt grass. I think Mr. Gibson said that he had 100 acres of it and he regarded it as useless. Well he is not alone in this. But this was, in fact, the basic grass which was left for us in this region, from the Clarence up to the Burnett, and now at least we have got half a dozen grasses and five or six legumes that we can exploit.

The other angle that particularly struck me was that the farmer today is using fertilizer. It would be a few years ago, now, when I was down the South Coast addressing the dairy farmers at Southport, and I spoke glibly about using four or five cwt of super and I had a very deadly and deathly silence. One of my audience got up to doubt the value of super and he was on the flats of the Nerang River. I asked him how much super he had put in and he said, "Well, I put in a bag"—he meant a cement bag. I said "It was a pity you didn't put it in the Nerang River! It might have helped the flatheads, but it wouldn't have done a halfpence of good on your pasture." And this, I think, is still true. What we didn't realize for quite a long while in coastal Queensland and in Northern N.S.W. was that our phosphate status was extraordinarily low over a greater part of the country and that when we were trying to emulate the people in the south putting a cwt of super on and getting no results the idea became established in Queensland that there was no phosphorus deficiency. There were two situations: one on the Darling Downs which doesn't have a phosphorus deficiency, or does in exceptional cases; and the other was extreme phosphorus deficiency, so the application of small quantities of super had no effect in either case. But now, as we know, the extreme deficiency of phosphate must first be corrected and in addition, of course, we have the other elements, both major and trace, that have to be looked at:— i.e. calcium, sulphur potassium, copper and molybdenum. In cases along the west of the country there is zinc deficiency too.

Now, what I was interested in this morning, particularly, was the property of the Eban Brothers, recent arrivals from New Zealand, and they didn't think it at all strange to put 10½ cwt of super to the acre in just about a year. They have come, of course, from New Zealand where 4 cwt. of super is standard practice and often it is applied in the autumn and the spring. This, I am sure, would have run them out of Currumbin five years ago. But you can see the enormous effect of this quantity of super on that country. I know they are striking troubles but I also know that these two men are going to solve their troubles. They are going about it in a most extraordinarily able manner and they are getting the information. Either they're picking up advice from you people in the Department of Primary Industries or picking it up goodness knows where, but certainly the way in which they are thinking about running that property and already talking quite cheerfully about two cows to the acre is most heartening. This, to me, is extraordinarily stimulating. The problems that each of our friends has pointed out to us, will, I can assure them, be very carefully noted and we will try to do our very best; in many instances we are already working on the very problems that are now coming to light in the farmers' hands. Clearly they come to our notice too, in our own experiments, but not always is it necessarily true that the research worker has to solve the problem. Quite often men who are on the farm and who are attacking the problem equally as intelligently as we are can solve the problem more quickly. One thing is, they are not quite so stick-in-the-mud as some of us that are trying to do research. Well, Mr. Chairman, I am sure that I am not the only one that has been stimulated and pleased to have these two days on these properties, and I am sure that this meeting will go away, both from the point of view of the practical men, and they will be able to apply the experiences they have seen and to improve the situation as far as our cattle industry is concerned along this coastal belt in Queensland.