

**THE TROPICAL PASTURE REVOLUTION — FACT OR FICTION?
SYMPOSIUM MEETING, BRISBANE, 11th JUNE, 1969**

**REVIEW OF TECHNICAL RESOURCES AVAILABLE TO THE FARMER
AND PROGRESS IN THE USE OF SOWN PASTURES**

by

D. I. SILLAR, PAUL MCGOWAN AND ASSOCIATES, BRISBANE.

Firstly, I would like to consider the progress in the usage of sown pastures in Queensland over the past 12-year period and establish if in fact we are undergoing a tropical pasture revolution, its magnitude, when it commenced, and some of the contributing factors. Secondly, I would like to briefly review the technical resources which are presently available to the farmer and comment on the technological deficiencies which have the greatest restraining influence on the farmer at the moment.

To measure progress in the area of sown pasture in Queensland we must rely heavily on the gross statistics available from the Bureau of Census and Statistics. From this source we can obtain the total area of what is known as "Introduced Pasture". This may or may not be sown pasture. (This is subdivided in the statistical returns into the area of "Paspalum" and "Other Introduced Species".) These statistics I believe measure the area of "improved pasture" in the very broadest sense and exaggerate the situation. Factors contributing to this exaggeration would be the inclusion of degraded pasture which is no longer effective, and the inclusion of forest cleared for native grass and areas planted to mat grass, which in the past, of course, was considered a valuable introduced species — particularly in northern N.S.W. where it is sometimes called Dorrington grass.

The magnitude of this exaggeration is gleaned from the comparison of the area of effective sown pasture determined by a Department of Primary Industries survey as at 30th June, 1968 and Bureau of Census and Statistics figures at the same date. The latter was approximately 30% higher. Notwithstanding the old riddle of "when is an improved pasture not", and notwithstanding that our concept of an improved pasture is probably insidiously changing, these statistics do give us a sound indication of trends.

The salient point from the Bureau of Census and Statistics is that the total area of introduced pasture in Queensland at 30th June, 1968 was 4.6 million acres. This represents an increase of 2.5 million acres or, more than double (x 2.2) the area that existed at the commencement of the decade. At the present rate of development the area of introduced pasture should comfortably pass the 5.0 million acres by the end of the 60's. Will this rate of 3 million acres per decade be maintained, and now that the technical restraints appear to be lifted, what other restraints, as in the Law of Minimum become operative?

The magnitude and rate of increase in area of introduced pasture can be seen in Figure 1. You will note: that the total area did not begin to rise steeply until the end of the 1950's.

Figure 2 shows the annual increase in area of introduced pasture which shows a marked annual variation, presumably dependent upon climatic conditions which prevailed. It is interesting to note the variation in the magnitude of contribution from the Fitzroy Basin Brigalow Development Scheme for the last 6 years and from the Dairy Pasture Subsidy Scheme for the last 2 years and to speculate on the significance of the variation. The changing nature of sown pastures is indicated by the increasing area of pasture fertilized. At the beginning of the 60's one acre of existing pasture was fertilized to every 100 acres planted in the same year. In 1967/68 5.6 acres of existing pastures were fertilized to every 100 acres planted.

FIGURE 1

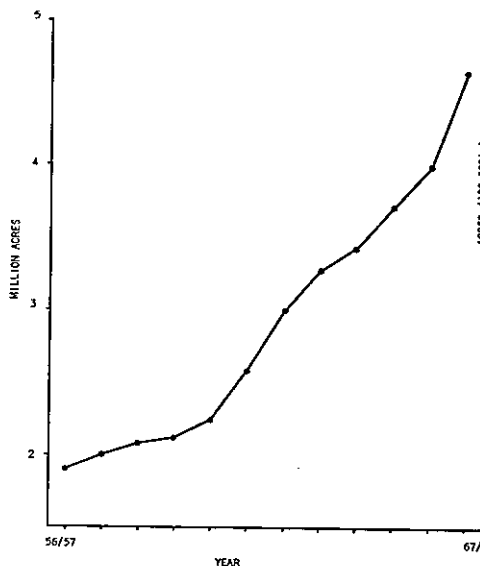


FIGURE 1 Total area of introduced pasture in Queensland 1956/57 to 1967/68
(source: Bureau of Census and Statistics)

FIGURE 2

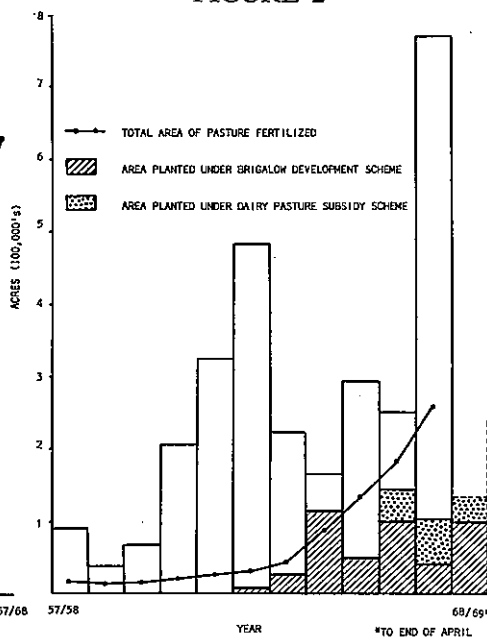


FIGURE 2 Annual increase in area of introduced pasture in Queensland 1957/58 to 1967/68

Whatever may be the external stimuli in the form of subsidy and development schemes or in the form of a buoyant beef cattle industry, the 60's have seen a tremendous upsurge, if not a revolution, in pasture planting activity which must lead us to believe that the technical resources, fundamental to the process, are in fact, well and soundly established.

What are these so-called technical resources? Fundamentally, they comprise materials, such as species, fertilizer and chemicals, and the knowledge of, how and when, and where to use these materials. They are complementary to the resources of land, labour and capital but a component of management is implicit. In agriculture, technical resources are a product of the continuing process of: research-extension-farm experience and application.

A feature which I suggest is peculiar to the tropical pasture revolution in Australian agriculture history is that the technology has been inspired and developed, in the main, from direct research effort and less so from on-the-farm experience and application. This, I believe, is a hallmark of vitality, energy and direction in the research effort but as with inbreeding, is likely to bring out recessive and undesirable characteristics. Having said this, I would like to underline my belief that this is a small price to pay for the tropical pasture revolution which otherwise would not have been possible.

Technical Resources

The technical resources make up a sizeable inventory and it is beyond the scope of this talk to provide an exhaustive review. I will simply earmark a few of the strong points and labour somewhat longer on the areas of deficiency.

Perhaps our greatest technological strength lies in the high rainfall areas in both the tropical and subtropical regions. Here, we have an adequate range of tropical legumes and grasses which collectively show wide edaphic adaptability.

While it is now recognized that these tropical species generally have inherently lower feeding values than temperate species, their use has increased dairy and beef productivity greatly and has allowed land which was otherwise agriculturally useless to be brought into production. It is known how to treat the land to ensure the best establishment; expertise has developed in planting techniques, legume inoculating procedures, and timing of agronomic operations. It is recognized when and what weed problems are likely to adversely affect establishment and maintenance and something is known of agronomic and grazing management practices and herbicides which might be used to overcome these problems; diseases and insects likely to attack tropical pastures are recognized and in most cases, methods of overcoming or avoiding these problems are known.

The brigalow developer today faces up to the task with much greater mental security due to the wealth of research findings and experience accumulated over the last six years. Almost cookery book recipes have been evolved for initial scrub development for reclamation of regrowth and maintenance. The lack of a pasture legume for this environment is not a technical restraint which precludes development by the farmer, but undoubtedly, he is living on borrowed time. Research is aware of this factor and is using this borrowed time to good advantage. We are led to believe that the ubiquitous lucerne (*Medicago sativa*) offers most prospect although in the higher rainfall areas of the northern brigalow, leucaena could be useful and at the same time, may help to buffer recurring droughts.

In the semi-dry tropics, the farmer can use Townsville stylo and superphosphate confident that increased production per beast and per acre can be sustained. Easy familiarity has developed with ways of getting Townsville stylo established and maintaining the sward.

At the moment, a legume is not commercially available for lighter soils in the semi-dry subtropical areas (with a greater frost hazard and winter rainfall component). Fine-stem stylo and siratro show limited promise. Here I believe we need something similar in the place of Townsville stylo in the north and subclover from the temperate areas. Notwithstanding the deficiencies in this latter environmental niche and notwithstanding the lower feeding value of all tropical species, we have a working suite of pasture species and other material, technical resources. From the farmer's viewpoint, a technological deficiency arises when he comes to use these tropical species — when he comes to integrate a unit of improved pasture into his whole farm production system. In some situations, the problem is less manifest than in others, and as more alternatives open up for one particular farm, so the problem of optimizing combinations of these alternatives arises.

The farmer has to ask himself questions like these:

1. What particular pasture is best able to overcome present inadequacies in my livestock enterprise, or is a pasture what is required?
2. If such and such a pasture is planted, can a new livestock activity be entertained?
3. What, of the alternative classes of land on the property, will grow the pasture best suited to the job?
4. How much of the particular pasture is required and when should it be grazed?
5. If I graze the pasture in a manner to give me greatest lift in income from livestock trading, what will be the longevity of the pasture?

I believe the time is now ripe for research-extension continuing to take greater responsibility in these areas of whole farm application. Possibly we suffer from a complex. A complex which might be called "Total-vegetation-replacement, one-pasture-mixture-over-the-whole-farm, maximum-production-per-acre complex".

Production system research could be carried out to provide the farmer with the answer to the question — how much development (and in what proportion) of 1, 2 and 3 pasture systems can one undertake in order to reach the interim objective of providing cash to undertake further development? I believe the type of pastures we have evolved predispose large external injection of capital.

We are not, however, completely wayward with lack of production system research in Queensland and the more noteworthy exceptions which come to my mind are at "Brian Pastures" where crop and pastures being integrated, and at Coolum Research Station where hillside wallum pastures are being investigated in their complementary function to wet heath pastures.

This type of approach is akin to the dual pasture systems proposed by Meyers with temperate species. If we look more closely at Whole Farm Production Systems, Water Hole Systems integrating tropical pastures, I believe we will see the emergence of the pure legume, special purpose pasture. Tony Evans has already shown the advantage of a high legume component in the wallum. At Mackay there is field evidence to suggest that a pure sward of Schofield stylo will guarantee cattle fattening in August, September and October, the three driest months of the year. The idea of using a pure sward of *Dolichos axillaris* (locked up on hillside frost-free paddocks) for spring feeding has appeal and the prospects of leucaena now that Hamilton and Lambourne have removed the infertility bogie, seem unlimited.

To summarize the technical resources available to the farmer, I would like to draw a parallel. The technical resources can be compared with a boy's first cricket set and the farmer with the boy. The cricket set itself, is not constructed of the same quality material as cricket sets have been made of, but has the advantage of utilization in the backyard and other areas where another set could not be employed. This set is giving the boy a lot of experience and helping him to develop other talents. The cricket set is fairly rudimentary with some major items missing, many minor items. The boy's father is, however, a handy bloke with a good tool kit and is quite proficient at making the necessary additional items and repairing damage. The boy and his friends have not completely discovered how to best use the cricket set. His father, although proficient at building the components, is a poor coach at the game of cricket. Slowly, the boy is learning and in the future will be placing increasing demands on his father for new components, refinements and repairs. I believe, however, it is the responsibility of the father to move into the coaching field.

A DAIRY FARMER'S VIEW OF PASTURE IMPROVEMENT

by

C. A. LEMON, "MUSA PARK", BEENLEIGH, QUEENSLAND.

So that you may understand fully the problems of the dairy farmer today, I refer you to this story. Two dairy farmers each won a large sum of money in the lottery. One was going to retire to the coast. The other when asked was he going to do likewise replied, "No, I am just going to keep right on dairying until the money is all gone".

I have been asked to speak as a dairy farmer on the positive and negative factors which influence a dairy farmer in deciding whether he will use sown pasture. I must emphasize that what I am about to say is only the personal

opinion of my wife and myself drawn from our personal experience over nearly twenty years on two farms. It does not follow that our methods are necessarily the best even for our farm, but in the light of our financial position and initial lack of experience they have proved adequate.

I will say here that we lean strongly towards permanent sown pastures as opposed to the alternatives of grazing crops, irrigation, hay, silage, zero grazing, purchased concentrates, and lastly, grazing on native pasture plus the naturalized paspalum, mat grass, etc., and any combination of these. I firmly believe that any farmer who is still using this last alternative, that is native pasture, paspalum, etc., is fast leaving the industry and we need look no further at this method.

I feel that the best way to illustrate our point of view is to tell you briefly of our experiences and mention the various alternatives and our attitude to them as we go along.

Our present farm is situated between Cleveland and Beenleigh about four miles from Moreton Bay. It has an area of 489 ac, about half of which is subject to frost. Approximately 60 to 80 ac were cleared and growing paspalum, mat grass and native grasses when we bought it. The rest was regrowth or virgin forest, with some scrub. About half the area is fairly steep and rough. The rainfall is about 50 inches varying in the time we have been there from 26 to 82 inches. We felt we could best use our time in establishing permanent pasture which would reduce the time spent on this area in the future to only that required for maintenance. This method of development also reduces to a minimum the amount of machinery required. For years we made do with a tractor, a chisel plough, a set of stump-jump harrows, a fertilizer spinner, and a mower. There have been plenty of times when we could have used more, but to date the only additions have been a heavy set of offset discs, and a spray plant for weeds. Keeping the amount of machinery to a minimum has kept the depreciation and interest lower and allowed any spare money to be used on seed and fertilizer.

Grazing crops generally entails too much cultivation on our rough slopes, leaving them open to severe erosion and so a permanent pasture is indicated for this reason alone. From the point of view of tractor driving these steep slopes demand close attention when being worked, are nerve-wracking and dangerous. The higher stand-over value of permanent pasture, in particular the legumes, is another advantage over grazing crops. We do put in some winter oats on our flattest land with a small amount of cultivation and high N application.

As for irrigation we have used it in the past but have found that due to a limited supply of water and the large amount of labour required with the type of plant found necessary, it appeared to us that it is preferable to take care of a much larger area of non-irrigated pasture and accept the lesser production from these in a dry time. Even within the range of our rainfall there has never been a time when we feared the loss of stock from a shortage of feed. Over the last 12 months, May to May, our rainfall has been 23 inches and our stock have averaged 185 head (adults and calves included) on less than 140 ac of pasture which is about 1 beast an acre. In a lower rainfall area we would naturally look more closely at the prospect of irrigation, to reducing the amount of labour with more efficient plant and ensuring the supply of water. It has always been our practice to develop the numerous gullies and other damp spots with para, kikuyu, and pangola grasses first, in preference to drier areas even though initially this entails more time due to the hand labour involved.

We have not been interested in conserving feed as hay because of the extra machinery and storage space needed. Furthermore, the climate is not very suitable so near the coast for hay making because of heavy dews and rain at hay making

time. We could of course buy hay and store it but there would still be the cost of storage and money tied up in hay that could perhaps be put to a better use elsewhere.

Silage suffers from much the same limitations as hay, money tied up in machinery and storage, further labour expended in feeding out, and cultivation costs if crops are to make silage.

Zero grazing again involves machinery plus feed lot facilities of some description. Labour is required every day and I cannot imagine what would happen when prolonged wet weather sets in.

Concentrate feeding involves first a very good business ability plus readily available money to buy feed at the right time in large quantities at a reasonable price. A good record keeping ability is necessary together with much attention to detail if wasteful feeding is to be avoided.

During the years that we have been dairying we have depended mainly on improved pasture and are using more and more as new and improved varieties of grasses and legumes are coming to hand. Furthermore the relative costs of some of the fertilizers are becoming less, making the use of sown pastures more attractive.

Unfortunately we haven't found it practical as yet to depend solely on sown permanent pasture for our winter feed, being compelled to grow a small area of oats with fairly high N and also to feed a little concentrate to fresh cows during the winter quota period. We do hope that sometime in the future our plant breeders or plant explorers will discover a frost-resistant legume of high quality to help the winter feed position.

I know some farmers between Brisbane and the South Coast who are disappointed with their tropical pastures. Many of these are using the Dairy Pasture Subsidy Scheme. I feel that some of the reasons for their disappointment are, the high cost of seed, two very poor seasons in a row with about half the annual rainfall, a general lack of fertility with, perhaps, too little fertilizer at planting time, and lastly, I feel that many of the farms are continuously overstocked, and when a fairly large proportion of the farm is cut off for new pastures the farmer may not be able to give the new paddocks long enough time to establish successfully.

We, in the dairying industry, have seen many trends in farming that come in with much acclaim, firstly by the press and secondly by an interested party who has something to sell, which is a legitimate method of doing business, but it means that an interested farmer must attempt to evaluate the relative worth of it for himself. A few years are necessary for the true value to emerge. For example, if you will cast your mind back to these, "steam up your cows and heifers to the last notch before calving and feed heavily after calving with concentrates while restricting roughage" — very good for the grain farmer and produce merchant. Another was, "every man an irrigation farmer" — extremely good for dam sinkers and machinery dealers. We have had silage and zero grazing offered to us, a year or two when we tried to sod seed everything and anything into old worn out pasture. Now we are in the midst of a tropical pasture boom, which I think is much more promising than all the others, but is perhaps being over-rated in as much as the hard side of it is not being presented as it should be. It should be made known that if you sow too little seed, on a poorly prepared seed bed, without enough fertilizer, stock it too soon, with too many cattle, you will surely lose it. If you do any one of these things you are taking a risk that the pasture may have to struggle on for years to become productive.

Let me conclude by saying it is sobering to think that, as I have heard it said, a farmer will have to increase his carrying capacity or production by as much as one half in the next ten years simply to maintain his present standard of living. The use of sown pasture seems to offer the best method of dealing with this problem.

A BEEF PRODUCER'S ATTITUDE TO THE USE OF SOWN PASTURES

by

W. J. D. SHAW, RODD'S BAY, GLADSTONE, QLD.

The tropical pasture revolution is definitely a fact, and a most fortunate one for the rural producers, because it will augment their incomes and so in due course it will benefit the urban people.

I suppose what the average beef producer wants from his property is a good living for himself and his family.

Up until a few years ago if this beef producer wanted to increase his income, because of family reasons or just because he wanted more money he could set about it by providing adequate water for all his stock, by ringbarking all available country and by subdividing his land into smaller paddocks to ensure more even grazing and better utilization.

Doing this would result in using the potential production capacity of his land to the fullest extent. Having done all this and still wanting more income his only recourse would be to buy more land to run more cattle.

Today this has changed. There is now a vast amount of technical knowledge about tropical legumes and tropical grasses. There is also knowledge of what these new species will produce under experimental conditions.

If a producer's property is in the areas suitable to tropical pastures he can, by intelligent use of all this knowledge greatly increase his production without increasing the size of his property. According to the amount of energy and money he put into the effort he could increase the number of stock on his property by 2, 3 or 4 times and his production of beef by up to 10 times, or in extreme cases even beyond this.

This may appear fantastic, but, these increases in production have been achieved in trials.

This type of development costs a lot of money but the dividends can be very high, sometimes as high as 25% on the money invested. One of the usual results is a reduction of running costs per unit due to greater concentration of effort and stock.

I will give you an example of a hypothetical property of 9,000 acres in Central Queensland, anywhere between Bundaberg and Mackay in the 30 inch rainfall belt, fully timber treated, watered and fenced, running 1,000 mixed cattle.

Previously, to increase his income the owner would have to buy another block of land. Say he wanted 1,000 more cattle so he would have to buy another 9,000 acres of well developed country. This, in that area, would cost him at least \$150,000 plus the cost of cattle. So he pays \$150,000 for the land to run an extra 1,000 cattle.

On the basis of present knowledge he could sow all his original property with Townsville stylo: for a start we will suppose his property will grow Townsville stylo without fertilizers. The sowing can be done on the ground or from the air and his cost, with Townsville stylo at \$1.00 per lb would be about \$1.30 acre, or about \$12,000. Perhaps he will need 6 new water plants costing say \$12,000, fencing \$3,000 and \$5,000 for unforeseen extras, in all \$32,000.

What does he get for this outlay:

For a start he must carry at least 2,000 cattle and as his better land will improve to a carrying capacity of 1 beast to 3 acres he will safely carry 2,500 cattle. This is for a capital outlay on the land of only \$32,000.

But he can do a lot better than this. He can use fertilizers. By using the correct type of superphosphate, which will cost him about \$2.50 on the ground, he can increase his carrying capacity to 1 beast to 2 acres. So you can see that it is possible to convert at a very economical figure a property now carrying 1,000 cattle to carry 4,000 cattle quite safely.

Norman Shaw of the C.S.I.R.O., Division of Tropical Pastures, has published data which show we can expect results like these in Central Queensland:

	Carrying Capacity	Liveweight gain per acre per annum
Native pasture	1 : 9	20 lb
Native pasture plus Townsville stylo	1 : 3	100 lb
Native pasture plus Townsville stylo plus fertilizer	1 : 2	200 lb

I think these examples show that the pasture revolution is a fact.

By using Townsville stylo and other tropical legumes such as glycines, Siratro, demodiums, lotononis, etc., and tropical grasses even better results have been achieved and, with irrigation, Officers of the Department of Primary Industries at Parada have reached the fantastic production of 1,000 lb liveweight gain per acre per annum.

Unfortunately the actual exercise of introducing these pastures is not easy. First of all the money has to be found by the producer. All too often a compromise has to be reached between what the scientists say is necessary in the way of land preparation, seeds, fertilizers and what he can afford.

Ever since I became associated with Norman Shaw and Jack Davies of the C.S.I.R.O. at Rodd's Bay I have been interested in ways and means of getting good tropical pastures at the lowest cost.

My scientific friends naturally are interested in the best, and always aim to produce a 100% pasture. However, these 100% pastures are very costly and while well within the means of a few wealthy people and syndicates looking for tax rebates, they are mostly beyond the scope of the average producer.

By and large the typical primary producers are not wealthy. They may control large assets but their cash incomes are not high and few have ready cash to invest in pasture improvement. They can and will invest their own hard work but most will have to borrow the cash, which of course has to be paid back with interest. If they don't invest in pasture improvements they may go downhill, if they do invest and borrow they have to service the loan.

Well, what is to be done about this. The producer wants to improve but all too often only has limited finance. We must build up a group of people who can assess a producer's financial capacity and then having obtained all the available data from the pastoral extension officer work out plans which are within the producer's capacity to finance. This will mean incorporating new technical inventions and machinery and perhaps some drastic alterations to present methods of pasture establishment. For instance, the usual way to establish Siratro is by 2 or 3 workings, before planting. I have obtained good establishment by seeding behind an offset disc or chisel plough. With fertilizer application these develop into a high grade pasture, and the cost is low.

I invented a machine and technique for planting Townsville stylo (or any other seeds) into ringbarked country at a cost of 30 cents per acre plus the cost of seed (if Townsville stylo seed costs 70c the total cost is \$1.00 per acre). A friend of mine acting on advice, seeded similar country and his cost was \$10.00 per acre. His advisor had him clear all the land first. His pasture is no better than mine which cost \$1.00 per acre, and is now carrying 1 beast to 3 acres.

Research and extension workers must look at this aspect of pasture development so they can play their part. Rural investment consultants and rural management consultants must be careful they are not advising their clients to spend more

than is necessary to produce a good tropical pasture. Finally — the producer — he does realize pasture improvement can bring him a better return for his work and outlay, but he must be very careful and look critically at his own plans or those of his advisors to make sure he is getting the benefit of the latest technical inventions and pasture research and will get the utmost economical result for his investment.

FACTORS INFLUENCING THE ADOPTION OF IMPROVED PASTURES IN QUEENSLAND

by

W. O. MCCARTHY, AGRICULTURE DEPARTMENT, UNIVERSITY OF QUEENSLAND.

‘Myself when young did eagerly frequent
Doctor and Saint and heard great argument
About it and about; but evermore
Came out by the same door as in I went.’

Omar Khayyam.

An occupational hazard for economists is the necessity sometimes to look at castles in the air in objective fashion. Occasionally this gives them the reputation of bogymen. Happily however, on the subject of the economics of pasture improvement I am in the ranks of the optimists. I am on record as showing that improved pastures do raise net income of primary producers. My economist colleagues in the Department of Primary Industries have published studies which show similar favourable results. I am even prepared to say that grassing the wallum for beef is profitable.

The general method of approach which the average primary producer (or his advisor) should use to judge the economics of investment in improved pasture for his particular property is by means of a partial budget. Here, all additional costs incurred in pasture improvement are compared with additional income and a decision made on this basis. The justification underlying this method is that if the proposal was not instituted the farm would go on as before. Hence, any change from current organization need only take account of the associated changes in costs and revenues.

Extra costs could include clearing, fencing, water supply, cultivation, seeding and fertilizing and subsequent maintenance. If extra stock need to be bought these are also a charge as is plant and machinery bought for the purpose of putting in or maintaining pasture.

Extra revenue is the estimated cash value of the increased production resulting from the improved pastures. This may be difficult to estimate as factors other than improved pasture may be working to raise production. For example better organization and management over time, favourable seasons. Or, on a dairy farm use of A.I. or herd recording and on a beef cattle property a change in breed. Still if records of past production are available over a number of years such factors can be approximately allowed for.

One point to note is to charge overheads only on the capital items bought exclusively for the particular job. For example, charge only running expenses on an existing tractor, but running expenses and overheads on a seeder bought solely for sowing improved pastures.

Consider for example two representative case study dairy farms in south-east Queensland. Basic data were kindly made available by Department of Primary Industries.

FARM A

Area: 247 acres.

No. of milkers: 61.

Area improved pasture: 20 increasing to 55.

Over a 5-year period production increased from 8,600 lb butterfat to 14,900 lb. Cow numbers remained the same.

Pasture establishment costs	— \$28 per acre
Annual maintenance costs	— \$7 per acre
Total additional costs	— \$2,930
Total addition returns	— 17,400 lb butterfat at 47 cents—\$5,472
Total increase in net income	— \$2,542 (Av \$508 per year)
Butterfat required to cover extra costs—	6,234 lb

FARM B

Area: 192 acres.

No. of milkers: 49 increasing to 60.

Area improved pasture: 38 increasing to 82.

Over a 4-year period production increased from 4,300 lb to 8,700 lb.

Pasture establishment costs	— \$34 per acre. Contract cultivation
Annual maintenance costs	— \$5 per acre
Total additional costs	— \$3,688
Total additional returns	— 9,700 lb butterfat at 47 cents—\$4,560
Total increase in net income	— \$872 (\$218 per year)
Butterfat required to cover extra costs—	7,847 lb

These two farms were chosen because Farm A started off about average for Queensland in terms of production and number of cows although number of acres is below average.

Farm B represents a problem farm in terms of acreage, initial production and cow numbers. Pasture establishment costs on Farm A are just a little higher than the average under the subsidy while on Farm B they are considerably above average because initial cultivation and seeding was done on contract.

However, while the economics of pasture improvement are sound the rate of increase of the total area under improved pasture in Queensland can at best be described as disappointing.

My research group at the University is undertaking continuing research on this problem. Our general conclusion to date is that agricultural scientists and extension workers have failed to acquaint or convince significant numbers of Queensland farmers that improved pastures are a sure bet. We suggest there is quite inadequate communication between research and extension workers and farmers.

The basis for our conclusion is data from 3 surveys we have carried out since 1962. One was of 220 dairy farmers in Boonah Shire, the second of 90 beef cattle graziers in Central Queensland and the third of 110 dairy farmers on the Atherton Tableland. In each case the farms were chosen at random to achieve a cross-sectional view.

Consider the beef cattle sample. Assuming that graziers do have plans for further property development the problem of substantially increasing the area under improved pasture has two aspects.

Firstly, lack of knowledge about improved pastures.

Secondly, reservations about such pastures.

Approximately 50% of the sample had no knowledge of local or regional trials. Approximately 25% had a vague knowledge and the remaining 25% a good knowledge.

Of those familiar with trials half thought that the results would not apply on their own properties because of conceived differences between their property and the trial areas.

74% of graziers in the survey had reservations about improved pastures.

34% thought suitable species were lacking.

21% were concerned with lack of persistence.

13% considered productivity was lower than expected.

10% were concerned with possible high costs.

5% thought there were problems with labour requirements.

Others conceived problems centred around cost and difficulty of establishment and additional labour.

We do not suggest that these points of view are necessarily valid ones but we do say that a necessary condition for a substantial increase in the area under improved pastures is their refutation by extension workers. Be clear, we are reporting survey results, not interpreting them.

Much the same sort of situation applies on the Atherton Tableland. When survey farmers were asked about major problems and to rank a list of suggested district problems handed to them the predominant response concerned improved pastures. Lack of suitable grasses and legumes and pasture pests were mentioned most frequently. Lack of credit was considered next most important.

Again, whether these opinions are true or false they need discussing and investigating so that areas of improved pasture increase at faster than the present rate. (Assuming that suitable species are available).

In general the critical questions to be answered are:

(i) How best to spread existing knowledge of these pastures

(ii) How best to clear up misconceptions about problems said to arise with them.

Firstly, we suggest more trials and demonstration areas. In Ceylon I was associated with a project to significantly increase rice production and so make the country self sufficient. A key technique was the setting up of simple demonstration fertilizer trials all over the island. At one stage there were over 1,500 of these. Increased fertilizer use and production increases have been spectacular. In 1965 rice production was 507,000 tons and in 1968 901,000.

Secondly, reading habits of farmers should be capitalized on as this was the avenue most frequently mentioned as the source of initial information about improved pastures. For example all beef graziers read Queensland Country Life and almost half read Queensland Agricultural Journal. Atherton Dairymen read two farm Journals a week on average.

I conclude that the tropical pasture revolution is a fact, but like so many revolutionary movements these days is a bit of a fizzer because revolutionary fervour alone is not sufficient to galvanize the populace into action.

DISCUSSION

Can you foresee the time when the whole of a property is developed with improved pastures without having some rough country to put cattle on at certain times?

Mr. Lemon: I hope to have all of my property that is available developed, that is the area over which I can get a tractor. I am not concerned whether I am using "tropicals" or other pasture species so long as they do the job I want. I am finding the value of white clover and, providing the fertility is high, will withstand severe grazing such as has been necessary this year with the drought. If the grazing pressure is not too severe all the time it is my impression these species will survive stress periods such as this as long as the fertility is high. I would even venture to suggest doubling the initial fertilizer recommendation to start with just to provide that background of soil fertility.

Mr. Sillar: I could foresee this as a problem if only one type of pasture was being developed on a property but we now have a sufficient spectrum of species to have two or three pasture systems on one farm. These are then being used at different times of the year. Such a system reduces stand-over feed as rough grazing to a minimum.

Mr. Shaw: I look forward to the day when the whole of my property is under improved pasture. As Mr. Sillar has just pointed out we have got a whole spectrum of species from which we can select and we know from past experience that there are several of these, which under extreme conditions such as drought, can be stocked very heavily for periods without doing them a great deal of damage. Following this last dry season we have evidence of this from The Gulf to Brisbane and quite a way inland many people have been amazed to find they can run a lot of cattle on these pastures and, in spite of dry conditions, keep on running them. A few years ago they would have hesitated to use these pastures in a dry time. Necessity has forced them into it and this has given people a great deal of confidence in their use.

Do you think the problem has been aggravated by the fact that many dairy farmers in particular have only put in a small area of improved pasture and have had to stock it very heavily during adverse seasonal conditions?

Mr. Lemon: Where dairy farms are small, say 40 to 80 acres, there is the problem of sparing the land for the process of pasture improvement. If you take 10% of 80 acres that is not a large area but it puts a great strain on the remainder of the property and often means buying in feed to supplement the herd until the pasture is productive.

Mr. Sillar: The dairy industry is generally a poor man's industry and usually the dairy farmer is up to his neck in debt. The pasture subsidy scheme gives him the chance for a little bit of improved pasture but he probably expects too much of these pastures and they tend to be over used. Drought will further aggravate the situation.

Dr. McCarthy: I think lack of experience in management is probably an important factor and it may, in fact, be this lack of experience which leads them to give opinions such as we found they gave in some of these surveys. The proper handling of tropical pastures is a pretty substantial departure from normal management practice, and it is a critical question on Queensland dairy farms.

Have we rushed into improved pastures without sufficient preparation and thus accentuated the over-grazing problem?

Mr. Shaw: Not really, but it is a question of management and this requires educating the farmers who are beginning to develop improved pastures in their proper management, I don't think this is difficult. Since tropical pastures are generally planted in the first half of the year when there is plenty of rain there is also plenty of other feed on the rest of the country. If the planting and

establishment of the pastures is carried out properly then they will be producing before the country dries off in winter. While too much pressure should not be brought to bear on them in the first year or so most pastures, particularly Siratro pastures will take very concentrated stocking after that if the need arises over restricted periods.

Mr. Lemon: In my experience with mat grass I find it tends to disappear with heavy fertilization (and I am using fowl manure here) together with concentrated stocking — this is controlled heavy grazing.

Does Mr. Sillar envisage with his suggestion of different pastures on one property that temperate and tropical species be kept to separate areas or mixed up as shot-gun mixtures?

Mr. Sillar: I don't like shot-gun mixtures at all. The sort of dual pasture systems that I visualize is that of white clover and, say, paspalum on the flats and tropical pastures on the hills. The flats would be grazed heavily in autumn and spring, the hills in summer and winter. The tropical pastures have to be strongly legume-dominant.

Mr. Harrison: I am not so sure about such a separation because I find you can grow some temperate species in a tropical pasture provided you give them the chance to seed themselves at the end of their season. The pasture can be grazed as a tropical pasture throughout the summer and providing there is some winter rain medics, clover and perhaps even Wimmera ryegrass can be induced to grow in the winter. This is far better than getting almost nothing from it over the winter.

Mr. Sillar: I am worried about how well the tropical species can withstand the prolonged heavy grazing pressure. I am also thinking of some winter pastures such as white clover/paspalum or white clover/pangola grass as a buffer when you can carry 2 beasts per acre if necessary in this unpredictable climate of the subtropics.

Dr. Hutton: I don't think you can keep the two systems entirely separate in the long run because white clover comes in naturally as the phosphate status of the soil is raised. In the southern spear grass country we have found the best pasture to be a mixture of rhodes grass or buffel grass with lucerne and Siratro. Of course, as you move into the tropics, out of the zone of any cool season rain, temperate species are no longer suitable.

A lot of people think that they must have high phosphate levels because they have been putting on superphosphate but it often takes a very large amount, sometimes up to 10 cwt/acre before you really reach the amount required for optimum production — these are the critical values for P which Mr. Andrew defines as the level of maximum economic return and this for most species must exceed 0.2%.

Does Mr. Sillar consider that the lack of application of results of pasture research in Queensland is in part the result of the relative lack of consultant services in the State? The southern States have a multitude of such services which are private, governmental and university operated.

Mr. Sillar: Technical and economic advice follow on from a solid foundation of technical knowledge. Without a sound background one is taking too great a risk in predicting budgeted events. We are getting to that stage slowly but we have not got anywhere near the proven agricultural background of the temperate areas of the country.

Dr. McCarthy: There is a general lack of extension services to primary producers in this State. The flow of information from research to the producer is going to improve as the number of these services and people increase. We are also short of innovators among the primary producers. These people are required

to solve the on-farm problems associated with this new technology as well as to generate enthusiasm. This will come but at the moment I think we are more or less on the verge of a great leap forward in both increases in acreage of tropical pastures and their efficient use.

Mr. Lemon: With small farmers of limited capital resources, I think there is a certain reluctance to talk with a consultant in case one becomes over-committed.

Dr. Ebersohn: I know two gentlemen, both of whom sought advice extensively, who are very disillusioned with the tropical pasture revolution. One developed pastures in North Queensland seeding Townsville stylo, applying plenty of molybdenized superphosphate and grazing at 1 beast to 3 acres. Three years after he had nothing but Townsville stylo left — the grass had disappeared. Now he doesn't even have Townsville stylo from August till November or December when it rains.

The other gentleman developed land on the south coast. He used desmodiums. Now the annemus weevil has eliminated his legume.

Mr. Shaw: All I can say about the North Queensland gentleman is that he didn't use his head. Even on my own property it is very obvious to me that there is a great deal of variation from place to place which is due to soil differences and so on. In some places there is very little Townsville stylo and in others there is a lot. If I overgraze I know I'll get Townsville stylo becoming dominant. If I graze too leniently I know I'll lose it. I consider that to aim at about 50:50 mixture of grass and Townsville stylo is the most productive situation for my country. I know that some people in the Northern Territory are favouring pure Townsville stylo stands to those incorporating a proportion of grass, but that is obviously how it suits them.

Mr. Lemon: I have not had success with desmodiums on the coast but that has not stopped me from trying other things. Siratro is very good and strangely enough to some people so is phasey bean. I have had a five acre paddock of phasey bean and kikuyu for 5 years. I can only attribute this to management. Glycine is also a good pasture legume in this district.

Dr. Ebersohn: I think this points to the fact that there is a problem here and it is one of communication. It is all very well to be enthusiastic about tropical pastures, and perhaps there is good cause to be so in many cases, but the pitfalls should also be stated.

Dr. Henzell: I am not sure that we should spend a lot of our time and energy on exhaustively determining what will grow here and there and why species will do well here but not there. Certainly we need the broad principles investigated. However, for the multitude of small inconsistencies which crop up within any given area, I think each man, in a sense, must be his own research worker. So often do we witness an atmosphere of gloom resulting from people who "did everything right but it all went wrong".

How much do you think the high price of seed, particularly tropical legume seeds, is inhibiting this revolution?

Mr. Lemon: For those people actively developing pastures it is a limitation because the area they can do in any one year is limited by the amount of money the bank manager will let them have.

Mr. Shaw: In contrast to temperate pasture seeds the price of tropicals is far too high and I'm quite sure this is stopping people buying more seed. It is a vicious circle, such that if the market were larger the growers and merchants could reduce their prices. I think the cycle starts with the seed producers and merchants because without seed no improvement could be undertaken.

- Mr. Fitzgerald:* It is true that tropical pasture seed has been very expensive. This has largely been due to the difficulties we and the producers have had in developing a seed industry based on species we have no background of information on, which often have agronomic characteristics not conducive to large scale seed production, and expensive modifications to standard seed harvesting equipment to handle these new and strange types. Mostly we have started from very small lots of only a few pounds and it has been necessary in short time to multiply this up to large proportions to meet the demand. We have also had some bad seasons lately. However, I am quite sure that these difficulties will be overcome and as seed supplies increase that the price will drop significantly.
- Dr. McCarthy:* On the basis of our survey information the high cost of seed was not a deterrent.
- Mr. Sillar:* I also believe the price of seed doesn't make much difference as long as the pasture is used efficiently. The existing enterprise might be giving a gross margin of \$1.80 per livestock unit. If you use the first "X" units of improved pasture to raise this to \$3 per livestock unit then you make enough to make the system self-regenerate. However, if you use these units of improved pasture simply to carry more cattle at \$1.80 livestock unit then you lose.
- Mr. Lemon:* I think the price does make a difference particularly to the farmer who has not gone into improved pastures before. He sees a price of 44c for paspalum and \$3.60 for the recommended species. Not only does the farmer have to be convinced of the desirability of spending \$3.60 instead of 44c but he has also to convince the bank manager to lend him the money.
- Dr. Ebersohn:* I think we could lay some of the blame at the feet of the scientists who develop these plants and demonstrate their superiority but don't show us how to produce seed from them.
- Mr. Shaw:* One of the important results of the high cost of seed is that many people are planting these things too lightly giving rise to thin pastures initially. In fact, I would almost suggest that if the price of seed is reduced, a farmer should still spend the same amount on seed and put more seed on each acre sown.

CONCLUSION

by

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I think we have had a most entertaining evening and I've enjoyed it thoroughly and I've enjoyed the discussions as much as I enjoyed the speakers statements. First of all, if we might comment on the fact or fiction issue, it seems to me quite clear that the revolution is fact. The question is, how fast are we revolving and whilst the relative growth rate, both of the acreage of sown pasture and fertilizer use in Northern Australia is very good, the variation of rate of progress from year to year is very interesting. This however, is very small by Southern Australian rates of progress and is still a very low proportion of producers and nobody I know has estimated what pasture improvement now currently means in economic terms in Northern Australia on a whole industry basis. Secondly, I feel it is clear from our discussions tonight that in technical resources we also have a very real revolution and that in the past decade we have seen enormous scientific advances in providing the sort of technology on which pasture improvement can proceed. However, I don't want to emphasize the success here. I think it is probably more helpful if we think of what are the principal areas of deficiency which people referred to tonight and these seem to me to be:

Firstly, in our lack of knowledge of pasture use and of the integration of different feeds on the farm.

Secondly, our deficiencies of legume species in some drier areas and the persistence of perennial legumes in wetter areas either because of a low tolerance to heavy grazing or because of pest problems such as amnemus.

Thirdly, establishment problems and here we alternated between requests for very much cheaper methods of establishment and on the other hand the need for thorough and cautious seed-bed preparation.

Fourthly, a weakness in seed production technology which also lies at the feet of the breeder.

Fifthly, weakness in farm management services and a lack of extension officers.

Now, the third category we might think about are the economic incentives and resources for pasture improvement. It seemed to me that here our speakers certainly were most optimistic. Mr. Shaw spoke about higher returns on capital and reduction in operating costs and Dr. McCarthy was a traitor to his economist friends by being optimistic about pasture improvements. The negative notes that were sounded here seemed to me to be largely in terms of access to ready cash by some producers, possibly high seed costs predisposed to low seeding rates and another aspect of perhaps access to cash, the small rate of improvement on a pasture which predisposed a farmer to heavy stocking.

One point which people didn't mention which surprised me a little was that many farmers have found the increase in available cash resulting from an improvement programme is a little slow to come when you are increasing your inputs all the time.

Finally, the social and educational limitations — Dr. McCarthy says that we have failed to induce a significant proportion of our farmers to improve their country — proportion of farmers who believe that pasture improvement is viable, that we have instead of innovators and apostles and fervent revolutionaries and I was a little disappointed that we didn't have more discussion on how farmers can be helped with their immediate field problems. Dr. McCarthy referred to the need for more field demonstrations and the need to capitalize on farmers' reading habits by providing useful material to them there. I think we might ask ourselves whether we need a much greater community investment in pasture extension and education and a real concentration on helping farmers themselves to maximize their resources in using effectively sown pastures.