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ECONOMICS OF AGRICULTURAL DEVELOPMENT IN NORTHERN AUSTRALIA

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When attempting to assess the economic prospects of development in any region it is essential to realize that these can only be measured for a given set of costs and prices using a particular technology. Any change in any of these three factors can alter the conclusion that *is* arrived at.

It is now thirty years since research was commenced to find technologies which would enable agricultural and intensive pastoral pursuits to be undertaken economically in tropical Australia. During this period new technologies have been developed and it is necessary to re-assess the prospects of development in the light of these discoveries. Over the same period the prices paid for agricultural commodites have fluctuated widely and costs of all inputs have increased. Changes in both of these factors could have a large effect on the economics of agricultural development.

The factor which has been most decisive in determining the profitability of agriculture in tropical Australia is the location of the region. For this reason it is unrealistic to treat it as one region. Most of Queensland and particularly the coastal region, is linked to southern Australia with good road, rail and sea communications and has a dense population by northern Australian standards. On the other hand, both the Kimberleys and the Northern Territory are isolated from the south and have only a small population. Because of the isolation and the resultant high cost of living, wages and other costs in the Kimberleys and the Northern Territory tend to be twice as high as in southern Australia, while wages and costs in Queensland are similar to those in the south of the continent. In these circumstances it is normally cheaper to produce any agricultural product in Queensland or in the south of the continent unless yields are twice as high in the Kimberleys and the Northern Territory. This fundamental advantage is unlikely to be overcome by any of the projects which have been suggested to date. Even the Ord River project, if it were fully developed, would only support a population of 10,000 to 12,000 people. Although Darwin has a population of 33,000 people, wages and other costs still tend to be twice as high as in southern Australia.

Research in northern Australia has led to the development of some plant varieties which give yields almost as high as those obtained in southern Australia. However, during the 1960s and early 1970s the price of most agricultural products was so low that returns to capital invested in agriculture in southern Australia were unsatisfactory. In these circumstances it is not surprising that all investigations into the economics of cropping or intensive cattle raising in the more isolated parts of tropical Australia indicated that development would only be possible if it were heavily subsidized. The only exception was the development of the Brigalow lands and Spear Grass land in Queensland, where the relatively high beef prices and the lower costs of this less isolated region made development economically attractive (Davidson 1972).

In 1973 the price of most agricultural commodites increased dramatically and it is possible that at existing price levels projects which were previously unprofitable would show a satisfactory return.

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Economic investigations into three major types of development in northern Australia have been undertaken during the last year. The results of these are discussed below.

Irrigated Cash Cropping on the Ord River

Irrigated cotton has been grown on the Ord River pilot scheme as a commercial enterprise since 1964. In the early years satisfactory economic returns were obtained because cotton was heavily subsidized by the Commonwealth Government. Surveys of the industry by the West Australian Department of Agriculture and the Bureau of Agricultural Economics indicated that once the subsidy was withdrawn, losses would be sustained by growers (Oliver and Hogstrom 1966). In spite of this evidence, the Commonwealth Government decided to construct the large dam capable of irrigating all of the 69,000 hectares of land available. With the complete withdrawal of the cotton subsidy in 1971 growers found the production of cotton unprofitable and the acreage grown declined from 48,000 hectares in 1966 to 1,000 hectares in 1973.

In view of the large area of irrigable land available for which no economic system of farming appeared to exist, the CSIRO undertook an examination of the economics of producing all of the crops for which sufficient experimental evidence existed (Johnson 1973). The results of these calculations, together with the assumptions on which they were based and the expected yields and prices, are shown in Table 1. These indicate that only peanuts and safflower would give satisfactory returns.

TABLE 1

Estimated yields, prices and profits from irrigated crops on the Ord River

	Profit or loss per hectare	Estimated yield per hectare	Assumed farm gate price
	$	tonne	$ per tonne
Cotton	-4.4	1.1	84 (lint
Peanuts	+71.7	3.2	224 (nuts in shell)
Sorghum	0.0	11.1	41
Rice (2 crops)	0.0	9.9	46
Wheat	-0.89	3.7	61
Maize (2 crops)	-103.4	7.7	41
Safflower	+3.51	2.7	102

Basic Assumptions

1. Profitability was calculated for a 267 hectare farm with a land price of $40.5 per hectare (this is the approximate cost of the initial levelling and clearing required).
2. Profit was calculated after meeting all production costs, including -
   (i) 8 per cent return to both long and short term capital
   (ii) An owner operator's living allowance of $8,000 per annum
   (iii) A cash cost loading to meet miscellaneous and unforeseen costs
3. The best available technology was assumed.
4. The yields assumed were those expected under commercial conditions.
5. Prices were the calculated farm gate price at the Ord River in June, 1973.

Source Brian Johnson, Economist, CSIRO, Canberra, August, 1973. (Personal communication).

The results must be treated with caution. Some of the yields assumed appear to be high in the light of past experience. The average yield of cotton on the Ord River for the five years ended 1972 was 959, not the 1065 kg per hectare assumed in Table 1. An average yield exceeding 1065 kg has only been achieved in one year. In addition, increasing difficulties are being experienced in controlling insect pests. The only other crop which has been produced on a commercial scale is sorghum and yields have only averaged 9.91 tonnes per hectare as opposed to the 11.1 tonnes per hectare suggested in the CSIRO budget. The remaining crop yields are based on experimental data. The average commercial yields of rice, safflower, peanuts, wheat and maize obtained on the Ord River are shown in Table 2.

TABLE 2

Estimated yields on the Ord River

	Average experimental yield per hectare	Expected commercial yield per hectare*
	tonnes	tonnes
Rice IR8 wet season (paddy)	11.5	7.5
Rice dry season (paddy)	3.3	2.3
Maize	6.0	4.0
Safflower	2.8	1.8
Wheat	4.0	2.8
Peanuts (Ord River)	3.3	2.3
Peanuts (Katherine, N.T.)	4.5	3.0

* Assuming commercial yield = 2/3 of experimental yield.

Source CSIRO Division of Land Survey and Regional Research Annual Reports, 1969-70 and 1970-71.

Cocks, D.G. "The profitability of peanut production at Katherine, N.T." CSIRO Land Research and Regional Survey, Technical Memorandum No. 69/19. Canberra, 1969.

Yields of crops with an average commercial area of from 40 to 200 hectares are seldom more than two-thirds of experimental yields (Davidson. and Martin 1968). On this basis the yields used in Table 1 appear to be optimistic. Even more important is the use of June, 1973, prices. Most agricultural commodity prices are at a higher level than at any period in the past. Cereal prices have increased because of a world shortage of wheat caused by poor seasons in major producing countries. The lifting of acreage restriction in the U.S.A., the world's major cereal exporter, and the return of normal seasons could soon re-create the surpluses and low prices which existed in the late 1960s. The peanut price assumed is for culinary peanuts, based on a small local market. Cocks, in an examination of the prospects for peanuts in the Northern Territory in 1969, concluded that a farm gate price of 6.6 cents a kilogram for oil crushing was all that might be expected (Cocks 1969). This is equivalent to a price of $68.28 per tonne nuts in shell. If this is substituted for the price of $224 per tonne for culinary peanuts the profit of $71.7 per hectare estimated in Table 1 is converted to a loss of $420 per hectare, even if a yield of 3.3 tonnes per hectare is obtained.

The net result of the economic investigation of cash cropping on the Ord River suggests that with existing technology cash cropping would not be profitable even at the high prices prevailing in 1973. The only exception is for culinary peanuts for which the market is extremely limited.

Cattle Fattening on the Ord River

In 1969 the Hooker Pastoral Corporation established 2,000 hectares of irrigated sorghum and utilized this crop to lot feed cattle, from its dry land holdings in the Kimberleys. So long as lot-fed beef was sold for the same price per lb as purchased stores, the operation was unprofitable. However, in 1973 beef was exported to Japan as a quality meat yielding a price of 84 cents per kg (dressed) at the farm gate. with store cattle available at 57 cents per lb the operation yielded a satisfactory profit. Details of the costs and returns assuming sorghum can be produced at $40 per tonne as estimated by the CSIRO are shown in Table 3.

TABLE 3

Costs and returns from lot fattening on the Ord River (per beast)

Costs	$	Returns	$
Purchase of store beast (340 kg @ 28.68 cents per kg liveweight)	97.50	239 kg dressed weight @ 83.78 cents per kg	200.26
1 tonne of grain sorghum	40.00*		
Labour	7.00		
Plant depreciation	1.50		
Interest on capital	0.50		
Veterinary expenses and mortality rate of 1%	1.50		
Transport (radius of 483 kilometres)	10.50		
Supplements	5.00		
Total	$163.50		$200.26

Profit = $36.76 per beast fattened

Basic Assumptions

1. Cattle retained in feed lot for 120 days.
2. Cattle gain 1.0 kg per day.
3. Dressing-out percentage 52 per cent.

* Break-even price of producing sorghum under irrigation on the Ord River-

Source East Kimberley Liaison Committee. Assessment of the Ord Situation, June, 1973.

For the first time in its history, the Ord River enjoyed a comparative advantage over the southern regions of Australia. In the latter area, the difference between the price per kg of store cattle purchased and lot fed cattle sold was negligible. On the Ord, stores which were of manufacturing quality only could be obtained at a much lower price than the premium beef which emerged from the feed lot. Even so, the area of irrigable land which could be utilized on the Ord River in this way would be extremely limited. The total turn-off of cattle from the Kimberleys is only 60,000

head per annum. With cattle consuming 1 tonne of sorghum per head and sorghum yield of 10 tonnes per hectare, all of the existing turn-off could be fattened using 6,000 of the 69,000 hectares of irrigable land available on the Ord River. The East Kimberley Liaison Committee has estimated that the turn-off might be increased to 140,000 head if cattle were sold as yearlings instead of at 6 years old as at present. In this system it is envisaged that young cattle purchased from dry land stations would be held on Pangola grass pastures at a stocking rate of 12.4 head per hectare for a period of from 4 to 10 months and then sold to lot feeders. However, to obtain a turn-off of 140,000 head, it is necessary to assume that each steer removed from the dry land station at an early age can be replaced by a cow and a calf (East Kimberley Liaison Committee 1973). As the nutritional requirements of breeding cows are higher than for steers, this is an extremely optimistic assumption. A more logical procedure is to calculate the existing stock equivalents in the Kimberleys from nutritional standards and then estimate the turn-off which might be obtained. The results of this calculation are shown in Table 4 and suggest that a total turn-off of 88,000 store cattle, as opposed to the existing 60,000 might be obtained. If this figure is accepted, then the total irrigated land required would be as follows:-

7,040 hectares of Pangola grass for 88,000 store cattle at 0.08 steers per hectare
8,900 hectares sorghum for fattening (assuming a yield of 4 tonnes per hectare and 1 tonne per beast)

15,940 hectares of irrigated land required.

Even the assumption that the turn-off from dry land stations could be increased from 60,000 to 88,000 must be treated with some caution. Trealor's work has shown that the major factor in determining turn-off is the weather (Treloar 1965). Large decreases in cow numbers occur during droughts and there is no direct evidence that this loss would be less if fewer male animals were grazed.

TABLE 4

Estimated present and potential livestock numbers and turn-off from dry land stations in the Kimberleys

		Livestock numbers	D.S.E.s per unit*	Total D.S.E.s*
Present situation selling stores at 6 years of age	Cows	150,000	15	2,250,000
	Stores	300,000	8	2,400,000
	Bulls	9,000	10	90,000
	Total	459,000		4,740,000
	Turn-off per annum =	60,000		
Potential situation selling stores at 1 year old	Cows	252,484	15	3,787,260
	Stores	88,370	8	706,960
	Bulls	25,000	10	250,000
	Total	365,854		4,744,220
	Turn-off per annum =	88,370		

* D.S.E. = dry sheep equivalents.

Basic Assumptions

Calving percentage = 50 per cent.
Mortality = 30% in 1st year and 6% in later years.

Source East Kimberley Rural Liaison Committee. Assessment of Ord River Situation, June, 1973.

The only means of producing enough store stock to utilize a large proportion of the Ord River project for fattening would be to convert the existing native pasture on the dry land stations to improved pasture using Townsville Stylo. However, such a procedure, even if it were profitable, would raise the quality and the price of store beef from the Kimberleys and decrease the profit margin obtained by lot fatteners, whose existing profit depends on converting an animal of manufacturing quality into prime beef.

Although lot fattening of store cattle is profitable. at existing prices it appears that a maximum of 16,000 hectares of irrigated land is all that could be used for this purpose. The remaining 53,000 hectares could not be utilized profitably using existing technologies.

Dry Land Pasture Improvement in the Northern Territory

Although it has been known for many years that the growth rate of cattle grazing under dry conditions could be improved by substituting Townsville Sty10 for native pastures, the operation was not profitable in the 1960s. In the late 1960s it was found that Townsville Stylo could be established by surface or aerial sowing after burning the native grasses. This eliminated the costly procedure of clearing and cultivation which was previously required before improved pastures could be established. The profitability of the new technology was first examined by the Bureau of Agricultural Economics in 1970 (McLintock 1970). It was found that a property of from 7,000 to 10,000 hectares carrying 3,000 adults when fully developed would only give an internal rate of return of approximately 6 per cent. Even at this level, annual returns would be insufficient to meet interest commitments on borrowings unless property owners had an initial equity of $150,000. When the 1970 study was carried out, the average price paid for cattle in the Darwin and Katherine meatworks was 37.5 cents per kg dressed weight. Because of the higher cattle prices prevailing in 1972, the calculation was repeated using a price of 48.5 cents per kg (dressed) and after adjusting for increases in costs which had occurred in the intervening period (Department of the Northern Territory 1973). However, even at this price the internal rate of return was only 6.9 per cent, assuming an initial equity of $125,000 (Table 5). Even if the price of cattle if raised to 57.3 cents, the price currently being paid, the internal rate of return only rises to 9 per cent. The annual return to capital after full development, assuming a beef price of 48.5 cents per kg (dressed) is 13.8 per cent. This should be compared with the estimated annual return to capital of 14 per cent from development in the Brigalow area and 15 per cent in the Spear Grass zone in Queensland in the early 1960s. , At this time the price of beef in Queensland was 35.3 cents per kg (dressed) (Bureau of Agricultural Economics 1963; Moyle and Haug 1965; van Holst Pellekaan 1964).

TABLE 5

Comparison of original and revised budgets by B.A.E.+

Performance criteria	Unit	Original B.A.E. budget price $0.375	Revised budgets (shorthorn cattle) price $0.375	Price $0.485*
Peak capital	$	357.953	300,459	285,669
Maximum debt ($125,000 equity, interest @ 6%)	$	286,033	256,037	229,924
Year of debt repayment	yrs	24	25	19
Net surplus (excluding sinking fund)	$	32,459	26,826	36,549
Internal rate of return	%	6.17	5.50	6.90

* $ per kg dressed

\+ In the B.A.E. budgets it is assumed that land has no value, only development costs have been charged. As land prices rise in southern Australia the low price of land in the Northern Territory might make development financially more attractive than it is at present.

The B.A.E. investigation suggests that pasture improvement with Townsville Stylo is only marginally profitable at the existing high cattle prices and would not be profitable at prices prevailing in previous years. The existing high price of beef is partly dependent on the high price of grains caused by a world wheat shortage and might well decrease as world wheat stocks increase.

Thirty years of research in the Kimberleys and the Northern Territory have not overcome the disadvantages caused by isolation. The only project which appears to be profitable is cattle feeding on irrigated sorghum and this enterprise is limited by the number of store cattle available. With this exception, better returns can still be obtained from further investment in the cattle industry in Queensland, or from agriculture in the south of the continent. Dry land fattening on Townsville Stylo in the Northern Territory is marginally profitable, but only for large companies with-a high initial equity in the enterprise and only if the existing high prices for beef prevail:

The possibility of establishing profitable intensive farming over an extensive area of northern Australia appears to be as remote in the 1970s as it was in the 1960s in spite of high prices of agricultural commodities.

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