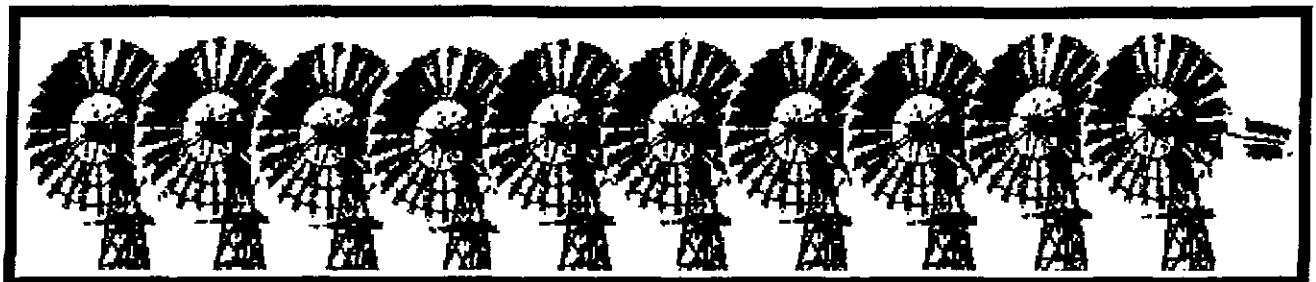

TOP PADDOCK

NEWSLETTER No. 8 October 1995

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EDITORS: Gladys Hore & Paul Graham
Department of Primary Industry and Fisheries
PO Box 79, Berrimah NT 082

ISSN : 1320 - 727X

EDITORIAL

It is currently a time of change for the Agriculture Division. We have lost two long serving staff members in our Director, Tony Hooper and Assistant Director, John Sturtz who have both retired.

The depth of knowledge and experience of both of these men will be sadly missed, although they are not leaving the Top End and they will not be completely lost to industry and the Department.

Dr Howard Dengate, the Deputy Secretary of DPIF is keeping an eye on the Division until the Director's position is filled.

Arthur Cameron has returned from secondment to CSIRO Division of Tropical Crops and Pastures in Brisbane, and has resumed his duties in the Pastures Group.

This issue seems to have an over emphasis on cattle production, but we will try to balance it out in the next issue.

RECENT PUBLICATIONS

Agnotes

D6 Green Manure Cropping in Horticulture

D30 Rambutan post Harvesting Handling

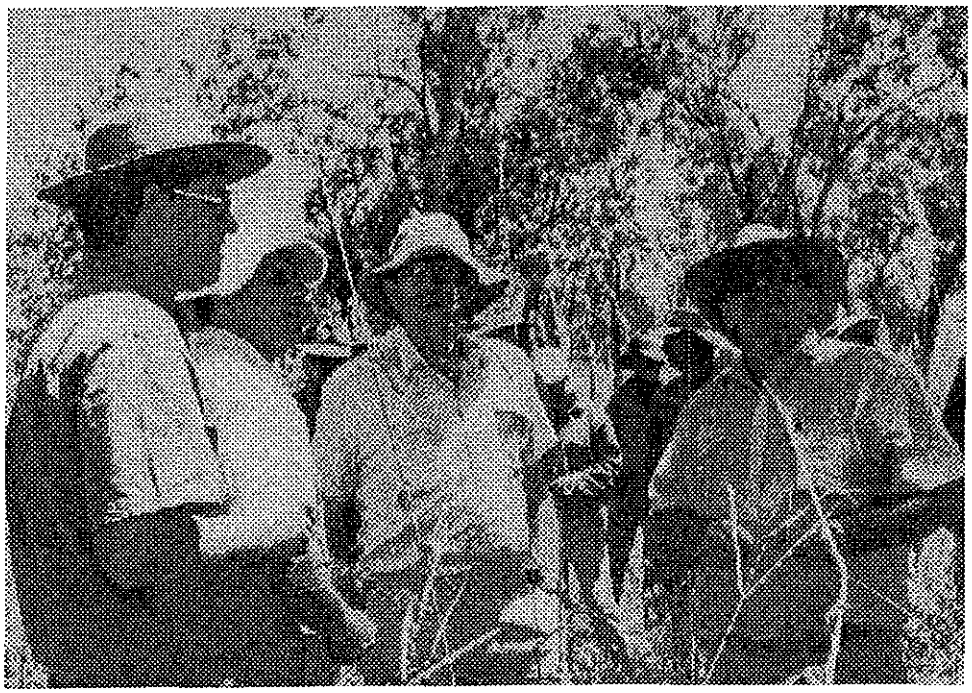
K27 Ironwood Poisoning

K28 Swainsona Poisoning in Cattle and Horses

Technical Bulletins

232 Sesame Research Report 1993-1994 Wet Season Katherine

234 Weed Identification Workshop Nusa Cendana University



Agriculture Management looking to the future.

CASUAL OBSERVATIONS OF FLOOD PLAINS AT TORTILLA FLATS

Tortilla Flats Research Farm made intensive use of about 200 ha of "Bulldust" flood plain for rice research, para grass assessment and other improved pasture research for over 30 years.

During my 20 plus years of involvement with the area it was apparent to me that the intensive Agriculture was having many beneficial affects on the soil and biology of the floodplain. The soils of the area were mainly solodics with shallow poorly structured loamy top soil overlaying impervious yellow clay. These soils are low in fertility and organic matter.

After a number of years of para grass the improvement in soil characteristics was marked. A layer similar to peat up to 40 mm thick had formed on top of the soil and the loamy top soil was full of organic matter and had an obvious build up in soil micro fauna. Whilst these para grass areas were fertilised in their early years, during the 80's they were not, yet plant growth was still abundant, and cattle production high compared to surrounding natural floodplain. The cycling of nutrients in the system was obvious.

The nutrient increase was also reflected in the huge increase in biological activity in the improved areas in the wet season. You could walk across the native areas, when in shallow flood and hardly see a fish, frog, or even insects. The para grass areas would be teeming with life, small fish, tadpoles, and many different insects.

Bird activity also reflected this with Magpie geese, Brolga's, Jabiru, Ibis, Spoonbills, and Egrets, always landing on these improved areas. In all those years of chasing geese off rice crops I did not once see them land on the native Themeda and Eriachne flood plain to the north of the improved areas.

According to Stan Brett, the first manager of TFRF, there were no geese present in the first few seasons at the farm. In my years there the geese would start arriving in September and concentrate on improved and irrigated areas. Irrigated para grass or para grass greening up after the early storms was stripped bare of leaf by the geese.

This pattern is still apparent today with geese attacking improved pasture, horticulture, cattle feed yards, or irrigated areas around the district. Geese stay in the district over the wet season feeding on barnyard grass sedges, and crop or pasture areas that have been fertilised. They leave the area in the second or third week of March.

The spread of para grass from this area over 30 years is negligible. Unless you cultivate to remove competition allowing para runners to contact the soil, and pond water to give better conditions for the para grass it doesn't spread much on these shallow flood plains.

BRUCE SAWYER

LIVE EXPORT TO SOUTH EAST ASIA: AN HISTORICAL CONTEXT

Cattle were brought into the Territory during the early military settlements in the 1820s. Fort Dundas (Melville Island) in 1824 and Fort Wellington (Raffles Bay) in 1827. The military settlers brought cattle from Sydney and from the Dutch East Indies (Timor). When the settlements were abandoned in 1892 some cattle were "let loose" in the hope of their multiplying and being useful, should the place be settled again. In 1838, another military settlement was established at Port Essington (Cobourg Peninsula). In the later years of this settlement many cattle escaped into the bushland and when the settlement was finally abandoned in 1845 buildings were destroyed and stock including cattle were "let loose". Cattle from Indonesia most certainly brought ticks and redwater fever into the Territory.

In 1870, approval was given for the construction of the overland telegraph line from Port Augusta (South Australia) to Port Darwin. The overland telegraph line was completed in 1872. To supply the construction parties with fresh meat stock (cattle and sheep) were, for the first time, brought by overland droving from South Australia and Queensland.

Pastoral settlement however, began around 1875 (Alice Springs District) and the 1880s was a period of intense activity and rapid development in stocking up pastoral leases with stock from Queensland and South Australia. By the end of 1888 the stock numbers had increased to 218,874 cattle and 107,078 sheep, and 251,680 square miles were under pastoral lease. Large number of bullocks were being turned off to southern markets by overland droving, through established stock routes.

In 1885, a small trial shipment of cattle was sent to Hong Kong by Messrs Fisher and Lyons. As a result of this shipment the South Australian Government instituted a subsidy scheme whereby a subsidy of £5,000 a year was provided to any contractor who would engage in live cattle export trade. In 1891, a special steamer, the "Darwin" capable of carrying 250 live cattle was built for Goldsbrough Mort and Co Ltd and in 1892, eight shipments each of about 200 head of cattle were made to Singapore and Batavia (Jakarta). The first shipment was from Adelaide River and the remaining from Port Darwin. This live trade continued until the end of 1897 with about 2,000 head of cattle exported each year (see Table 1).

In 1888 the outbreak of the redwater fever led to huge reduction in the cattle numbers and area stocked. As a result interstate movement (overland droving) was stopped. In 1896, the Dutch authorities banned further live export trade to Batavia because of the dangers of redwater fever. Trade with Singapore was eventually discontinued in 1897 due to heavy financial losses.

Despite considerable difficulties with respect to markets, meat processing (lack of facilities); diseases (redwater fever, ticks etc); environment (tropical climate and drought) and problems associated with isolation, settlement proceeded and by 1910 the majority of the areas currently utilised by the pastoral industry were occupied. By 1911, the cattle population had developed some immunity to redwater fever and in 1899, restrictions on Territory stock into Western Australia was removed and later restrictions were eased in Queensland, South Australia and New South Wales. In 1900, the Dutch Government removed the ban on the import of Territory cattle into Batavia, but without any subsidy for transport no trade eventuated.

In 1905, Queensland imposed a law requiring dipping (to remove ticks) of all cattle moved from the Territory to

Queensland. To facilitate the dipping of cattle, a government dip was constructed along the stock route at Anthony's Lagoon in 1906. This was the first dip in the NT. Marketing however, remained one of the main problems of the industry. In 1917 the North Australian Meat Company (Vestey's) opened a meatworks in Darwin. It was never profitable and closed in 1920. In 1918 Wyndham (Western Australia) meatworks was established. After the closure of Darwin meatworks, a majority of the cattle were marketed as stores in Queensland and South Australia. By October 1946, the stock routes in use in the Territory measured 2,200 miles in length and were equipped with a total of 98 watering places (majority of them were bores and mills). Some VRD cattle went to Wyndham for slaughter. After the collapse of its meatworks at Darwin, Vestey's developed a small and successful live cattle trade to Singapore and Manila in 1922. The trade lasted till 1930.

The industry was adversely affected during the great depression of the 1930's as cattle prices declined to extremely low levels. But the years of the World War II provided the much needed boom to the industry. The industry was again beset by problems and this time it was the drought of the early 1950's. The drought became the catalyst for the use of road transport for the marketing of cattle as droving of drought affected cattle became difficult. Vestey's begun to use road transport in 1956 to market NT cattle interstate. The use of road transport in part led to a reduction in the turn-off age of the cattle. The successful attempts to use road transport to market cattle and the 15 year meat agreement with United Kingdom in the 1950s prompted the Commonwealth government to introduce the Beef Roads program which began in earnest in the NT in the early 1960's

The 1960's also saw some fundamental changes to the pastoral industry in the NT. Equal pay and minimum standards of accommodation for aboriginal workers were introduced. The resulting increase in labour costs triggered some capital intensification on the pastoral properties. With the opening of the US and Japanese markets prices were buoyant and this led to further investment in the industry (introduction of *Bos indicus* cattle, some pasture development and improved management systems). New export meatworks were established in 1963 to service the new markets.

The oil price crisis of 1974, which triggered a global collapse in commodity prices brought to an end the boom of the 1960's. Live export to South East Asia re-emerged in 1975, after brief revivals in 1947-48, in late 1950's and early 1960's. Although the live export trade continued on a smaller scale, it was only since the early 1990's that the trade has emerged as a dynamic and significant alternative market for NT cattle (see Fig 1), due to changes in economic policies in countries such as Indonesia, Malaysia and Philippines which led to greater opening up of the market for live cattle imports. Over the last few years the strong growth and higher price in the live cattle export trade has greatly enhanced the future viability of the cattle industry, particularly in the North. The live export trade has set a competitive price pattern for feeder and slaughter steers in the Territory, underpinning all markets for store cattle and adding value to breeding cattle and even to properties.

Buffalo were also imported from the East Indies (Timor) during the early military settlements in the NT. Further introductions of buffalo into the NT were made from Timor during the 1840s and from India in 1886. These buffaloes were intended as rations and work animals for the early military settlements along the northern coast. Some escaped, or were released, and formed the basis of the free range animal herds which roamed the wetlands of the coastal and northern rivers of the Northern Territory.

TABLE 1: NT LIVE EXPORT TRADE 1885 - 1980

	Destination		Number of Cattle	Number of Buffalo	Total Number
1885	A small trial shipment of cattle sent to Hong Kong from NT		NA		
April 1892	To March 1893	Batavia/Singapore	2192		2192
April 1893	To March 1894	Batavia/Singapore	2002		2002
April 1894	To March 1895	Batavia/Singapore	2136		2136
April 1895	To March 1896	Batavia/Singapore	2358		2358
April 1896	To March 1897	Batavia/Singapore	2076		2076
April 1897	To March 1898	Singapore	1419		1419
1889-1920		No Trade			
1921-1930		Manila (Philippines) (1925 - 8 800 head and in 1928 - 7 300 head)	55000		55000
1947-1948		Live export to SE Asia recommenced	NA		
1949-1954		No Trade			
1954-1955		Philippines	1783		1783
1955-1956		Philippines	586		586
1956-1957		No Trade			
1957-1958		Philippines	1888		1888
1958-1959		Philippines	3928		3928
		Hong Kong	3451	94	3545
1959-1960		Hong Kong	6510	44	6554
1960-1961		Hong Kong	2365	85	2450
1961-1962		Hong Kong	6594	92	6686
1962-1963		Hong Kong	7670	91	7761
1963-1964		Hong Kong	3271		3271
1964-1974		No Trade			
1974-1975		NA	405		405
1975-1976		NA	4521	354	4875
1976-1977		NA	12488	215	12703
1977-1978		Brunei	2499		2499
		Sabah	2528		2528
		West Malaysia	1487		1487
		Hong Kong	8181		8181
		Sarawak	1067		1067
		NA		379	379
1978-1979		Brunei	3824	471	4295
		Sabah	4218		4218
		Sarawak	342		342
		West Malaysia	9226	160	936
		Bahrain	1361		1361
		Papua New Guinea		628	628
1979-1980		Hong Kong	1354		1354
		Sarawak	600	165	765
		Sabah	3784		3784
		Brunei	2362	613	2975
		West Malaysia	12704	230	12934

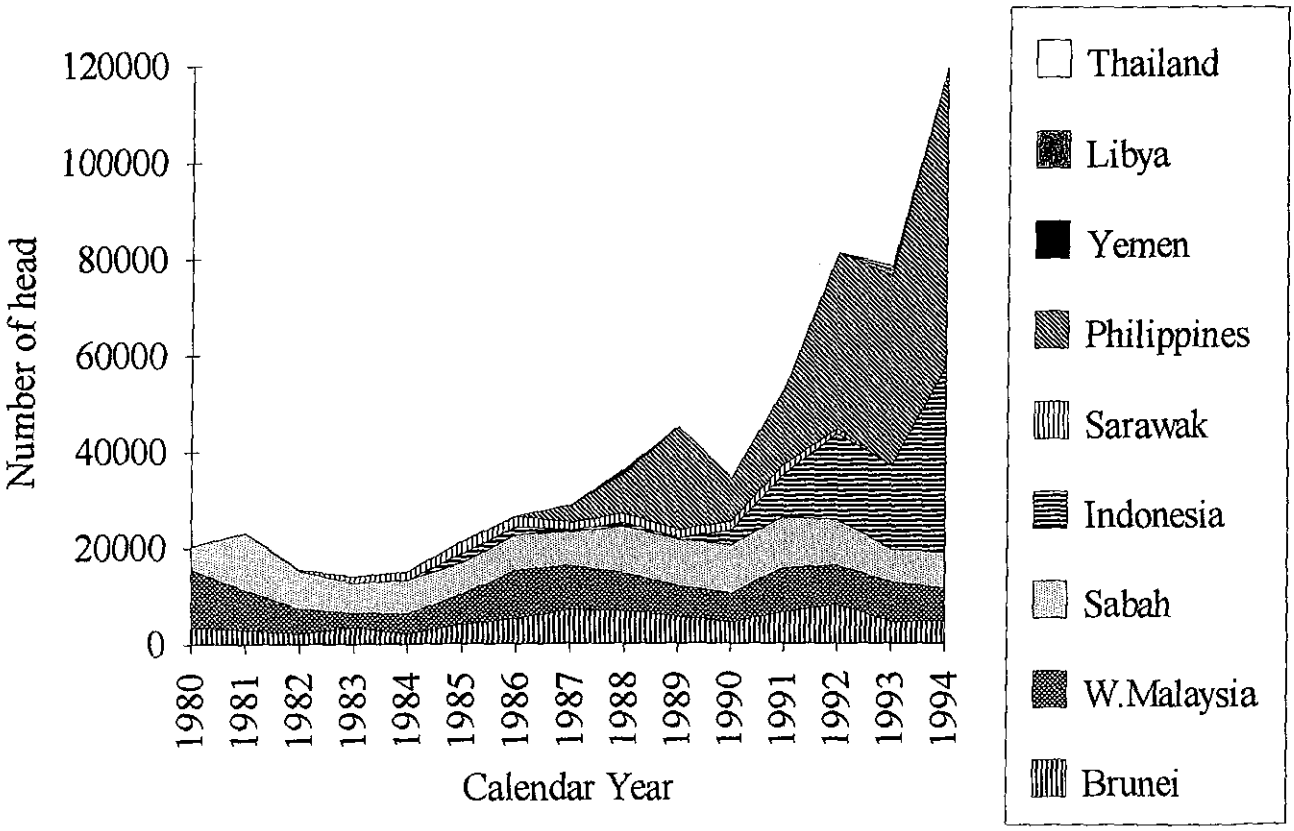
Buffalo were originally hunted for their hides but since the early fifties they have been slaughtered mainly for pet food and for human consumption. The live exports of buffalo began in 1958 -59 when a small mob was sent to Hong Kong. The Hong

and since then small numbers have been sent mainly to Brunei for slaughter.

The introduction of the National Brucellosis and Tuberculosis Eradication Campaign (BTEC) in 1970 entailed some drastic and fundamental changes to the cattle and buffalo production in the NT. Infected cattle and buffalo (both domesticated and feral) were destocked which greatly reduced the herd size. Feral harvesting of cattle ended in the North. Similarly feral harvesting of buffalo (except in the Tuberculosis (TB) monitored negative areas in the Southern Arnhemland region) also ceased. BTEC induced greater control of herds through property and paddock fencing has provided impetus for increased adoption of better management practices like weaning and strategic supplementation. After the BTEC destocking of diseased cattle, pastoralists are restocking with more appropriate types of cattle and this is contributing towards increasing productivity levels in the pastoral industry. The proportion of *Bos indicus* cattle is also rapidly increasing in the tick affected areas of the NT. The Territory, through its BTEC program, gained Brucellosis-free status in 1988 and is on target to achieve Tuberculosis-free status in 1997.

The buffalo industry, at present, is in a rebuilding phase after the impact of BTEC. The NT buffalo population comprises animals of the Swamp type. In 1994, buffalo industry and NT DPIF commenced importing River type buffalo from USA with the aim of producing a better meat animal and of exploring the potential of buffalo dairying. It is moving towards a TB free industry with high quality meat (Tenderbuff) production from domesticated herds.

Figure 1. EXPORT TRADE IN LIVE CATTLE ORIGINATING FROM THE NORTHERN TERRITORY



SHIW MURTI
ECONOMICS

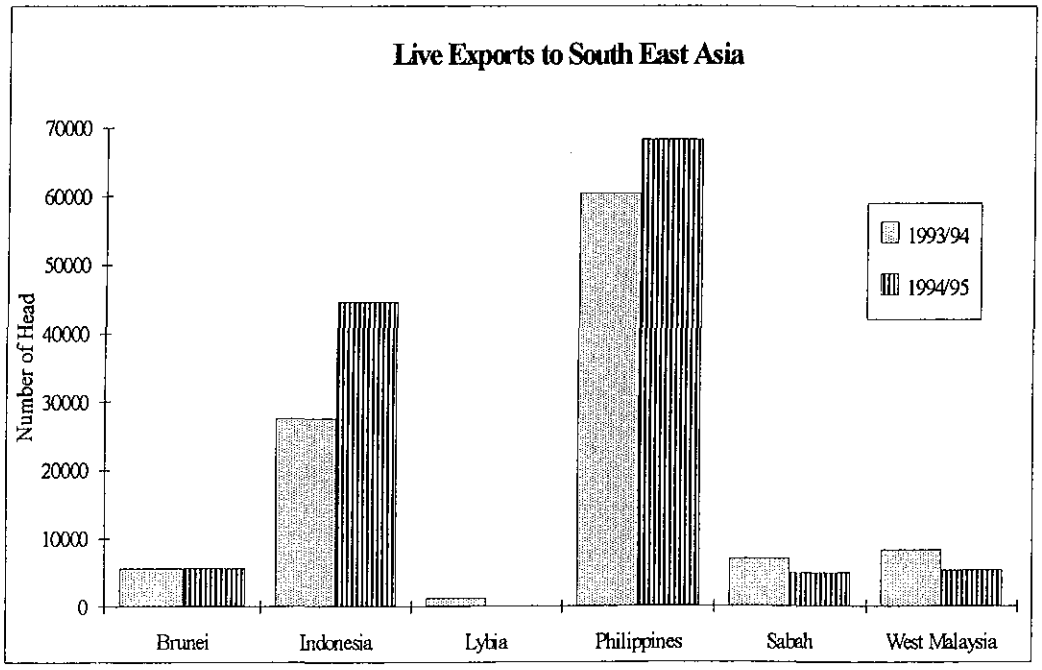
LIVE CATTLE EXPORTS TO SOUTH EAST ASIA, 1994-95

An estimated 128,770 NT cattle were exported from the Northern Territory in 1994-95. This was 17% more than the number of NT live cattle exports in 1993-94. The number of interstate cattle exported through the port of Darwin in 1994-95 was 110,819. This was 89% more than the number of interstate cattle exported in 1993-94.

From January to June 1995, the number of NT cattle exported to South East Asia from the ports of Darwin and Wyndham was 63,181. This was 20% more than the number exported in the same period of 1994.

The number of interstate cattle exported through the port of Darwin in the first 6 months of 1995 was 70,564.

	Northern Territory				Interstate Cattle Through Port Darwin			
Destination	Slaughter	Breeder	Store	Total	Slaughter	Breeder	Store	Total
Brunei	5649	0	0	5649	350	15	0	365
Indonesia	5453	631	38504	44588	793	527	57329	58649
Philippines	0	5170	63098	68268	0	2579	44800	47379
Sabah	3590	0	1363	4953	0	0	580	580
West Malaysia	1354	24	3934	5312	20	121	3705	3846
Total	**16046**	**5825**	**106899**	**128770**	**1163**	**3242**	**106414**	**110819**



Shiw Murti & Chris Kraus, Economics

This most recent investigation into agro-forestry, which investigates the fodder component, shade characteristics, N fixing capabilities and timber production potential is being undertaken at 3 trial sites in the forthcoming 1995/96 wet season.

2 at DDRF
- fodder trees
- high value timber species
1 at BARC
- high value timber species

The Fodder Tree trial at DDRF was initiated to evaluate the potential for increased production in grazing/browsing cattle. It has long been recognised (especially in S.E. Asia) that multipurpose tree legumes have the capacity to enhance the productivity and sustainability of tropical agricultural systems.

By far the most beneficial feature of tree legumes is their ability to fix atmospheric nitrogen. Biologically fixed Nitrogen is by far the cheapest and potentially the largest source of N for tropical agricultural systems. N fixed by legume trees can be utilised in a number of ways.

1. N transformed into leguminous protein may be consumed directly by animals to meet their protein requirements and the excess returned to the soil as wastes.

2. N may be returned directly to the soil as organic mulch.

Other benefits from the planting of Fodder tree legumes can be:

a. Usually long lived and low maintenance can therefore enhance the sustainability of farming systems
b. Stabilise sloping and or vulnerable land against erosion because of their deep rooted habit.
c. Provide a source of timber and or firewood.
d. Can be used as shade trees for animals and other plantation crops.
e. Ability to increase stocking rates/liveweight gain in cattle.

One trial to evaluate species that produce high value timber has already commenced at BARC. On August 31 a tree planting day got underway with the Minister for DPIF - Mick Palmer planting the first seedling tree. At the end of the day, 700 trees were planted by DPIF staff, Greening Australia staff, Timber Industry Network personnel and a host of interested volunteers.

Seven species were chosen and are being evaluated in 5 irrigated replications. The following species are represented:

Red Mahogany - *Eucalyptus pellita,*
Crows Foot Satin Bush - *Flindersia australis,*
Burdekin Plum - *Pleiogynium timoriense,*
Deep Yellow Wood - *Rhodosphaera rhodenanthema,*
Cigar Box Tree - *Cedrela odorata,*
Bush Apple - *Syzygium forte* and
White Bush Apple - *Syzygium armstrongii.*

The day was a great success and well covered by the media, more importantly the trees are still alive.

Trees for the 2 DDRF trials are growing successfully in shade houses at BARC, DDRF and NT University. These are to be planted out this wet season in what will be mostly dryland evaluation.Reference: Gutteridge R.C., Shelton H.M. Forage Tree Legumes in Tropical Agriculture. CAB International

DON REILLY
TECHNICAL OFFICER,
FERTILITY AND NUTRITION

Minister for Primary Industry and Fisheries Mick Palmer planting the first tree at Berrimah Farm

RIVERINE BUFFALO CROSSBREEDING UPDATE

There are now 40 riverine cross calves that have been born since May 1995. The calves have been quite large at birth - up to 56 kg, but the cows were in very good condition and some had not had a calf for two years. There have been 2 calf deaths - one born dead (53 kgs) and the other from an accident in the yards.

The cows are now being re-mated this dry season and one bull is currently at work on a private property.

The bulls were mated singly to two mating groups in the CPRS Breeding Herd during the February to June period and the pregnancy tests have just been carried out.

The pregnancy tests predict another 30 calves to be born to these two bulls starting in January 1996. This result is a little disappointing, however, more than 70% of the cows mated were lactating during the mating period.

BARRY LEMCKE
DISTRICT AGRICULTURAL OFFICER

A SURVEY TO ESTABLISH GENERAL DIRECTIONS OF CATTLE PRODUCERS IN THE TOP END

Summary

A survey of a representative sample of Top End cattle producers established that the large majority of respondents (20 of 25) rate breeding as their enterprise's first priority. Buying in of weaners to grow out for the live export trade was not identified as a priority.

Prices that Top End cattle producers are likely to offer for weaners may not match the expectations of cattle producers on extensive inland cattle properties.

Materials and Methods

Twenty-five cattle producing enterprises in the Top End were interviewed by telephone. They were advised that they were being invited to contribute to a survey to determine the likely future direction of the Top End cattle industry. After gaining their consent (there were no refusals), the interviewer then proceeded to ask six questions which determined the enterprise size (with respect to numbers), the origins of the stock, the relative priorities each producers accorded to various production systems that are known to be practised in the local industry, the likelihood of these priorities changing, and whether or not each producer was interested in buying in weaner steers for production of live export steers. If they were interested, they were asked to nominate a price they would be willing to pay for weaners knowing that their sale price would be (1) $1.00/kg liveweight, or (2) $1.50/kg liveweight.

Results

Twenty-five cattle enterprise owners/managers were interviewed. Collectively, these people had ownership or management of 73 000 cattle and 7 000 buffalo.

Composition of herds in the sample

Of these, 23 000 were cattle breeders, and 3 000 were buffalo breeders. Three thousand head of cattle were bought in, as were 1 000 buffalo. Thirty-one thousand cattle in the study were on agistment. The balance of cattle and buffalo were progeny of the breeders.

Respondent's priorities

All identified a top priority for their operations. One respondent ranked several options as priority 1. Nine respondents identified a single priority for their operations, five each identified either two, three or four priorities for their respective operations, and one identified five priorities.

Fifteen identified a priority 2 option, nine a priority 3, and four a priority 4.

The priorities identified in the survey were categorised into three broad categories:

Category of enterprise	Comprising
Breeding	- Breeding for weaner and yearling turnoff - Store breeding - Breeding slaughter animals - Stud cattle breeding
Buying in	- Buying in for feeder production - Buying in for finishing for slaughter
Agistment and depot-ing	- Providing grazing for growing out animals for the live export trade - Providing areas for short or medium-term holding of animals for the live export trade.

First priority

Twenty of 25 respondents (80%) ranked breeding as a first priority. One of these 20 also listed agistment or depot-ing as an equally high priority. Thus, 19 (76%) identified breeding as their single highest priority. Five respondents listed agistment or depot-ing as their highest priority.

Second priority

Of the fifteen respondents who identified a second priority, eleven identified breeding, three identified agisting or depot-ing; one identified buying in for finishing. (Some respondents who had identified breeding as their first priority also identified another aspect of it as their second).

Third priority

Eight third priorities favoured agistment, depot-ing or buying for the live export trade. One favoured breeding.

All fourth priorities related to catering for the live exporters.

Likelihood of priorities changing

When asked if their priorities will change in the future, eight said "Yes", eight "No", and 9 indicated that they were unclear as to their future directions with respect to their priorities. Most who were flexible or undecided with respect to future directions indicated that they would be guided by market conditions and demand.

Buying in cattle for the export industry as an option for Top End cattle producers

Thirteen said they would consider buying in weaners to finish for the live export market as an option. Another said they would not consider such an option, except in exceptional circumstances (interest free finance and a surfeit of pasture). This respondent was included as an extra potential participant in questions related to the "buying-in" option.

When asked what maximum price they would pay for weaners when export steers were fetching $1.00/kg liveweight, twelve respondents volunteered a price. The average price volunteered was $0.83/kg liveweight, with a range of $0.60 to $1.00. When asked the same question with respect to a sale price of $1.50/kg liveweight, all fourteen interested respondents volunteered a price. The average price was $1.24/kg; the range was $1.10 to $1.50.

Discussion

The conclusions to be drawn are clear and unequivocal; breeding was the primary focus of the majority of

respondents in a representative sample of Top End Cattle producers; there was no strong indication that this is likely to change.

Prices that Top End producers are willing to pay for weaners are much lower than those estimated by Hristova, Stockwell and de Witte (1994) as break-even prices for weaner steer production systems in the VRD. When on-property sale price of export steers is $1.00/kg liveweight, equivalent returns from weaner sales are available to VRD producers when (depending on the production system) weaner prices are in the range $1.04 to $1.33. No respondent in this survey volunteered a price for bought-in weaners in this range (given a live export steer price is $1.00/kg). All were below this range, and the average was some 20% below the bottom of that range.

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Hristova, V., Stockwell, T and de Witte, K. (1994). Herd management for sustained productivity and profitability: targeting selling age. Working papers, The Australian Rangeland Society 8th Biennial Conference, June 21-23, Katherine, Katherine, NT, Australia, PP 311-312

GEHAN JAYAWARDHANA
& COLIN McCOOL

SINGLE DISC VEGETATIVE PLANTER (SDVP)

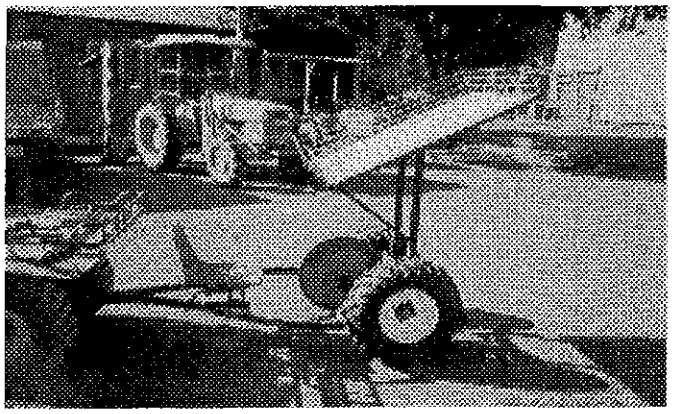
The construction of the SDVP was stimulated after viewing a Ponded Pastures Video from Queensland where the idea and design originated.. This machine is simple and relatively easy to make. A 500 mm diameter disc made from 8 mm thick steel plate is mounted on a lightweight 2 wheeled trailer and when planting, forms a 100 mm deep groove in the soil. A person seated forward of the disc drops grass runners on the ground. The disc then rolls over the runners pushing them 100 mm into the soil, leaving them standing upright. It is simple and effective.

The proto-type SDVP constructed by Pastures Section is basically an open frame assembly using 50 mm x 25 mm RHS boxing for the main frame and the disc support frame. The disc arm was made using 30 mm x 30 mm heavy angle and the disc is attached to this using self centering bearings. The disc axle is 19 mm rod. The trailer axles are standard trailer stubb axles with hubs, tyres and rims from the rear of a 4x4 quad bike We used these tyres because they were available, but any small car tyres and rims can be used. A plastic chair on a steel frame was attached to the trailer for the person planting to sit on. A tilting tray was placed over the disc for easy access to runners. Overall length of the SDVP is 2.4m, height is 1.5m and width 1.05m. Total weight is approximately 70 kg. Cost of materials minus tyres & rims was approximately $330.00.

The SDVP was designed to be pulled by a 2 or 4 wheel drive quad bike in low gear for use on damp/wet undisturbed black soil plains. If the native grass is too tall or thick, spray with Roundup ® but do not plough as the quad and the SDVP will bog in sloppy mud.

Pastures Section staff have also had success using the SDVP planting jarra grass runners into ploughed loamy earth at BARC, and other pastures will be tried in the future. For more information contact Ben Beumer on 992 302.

BEN BEUMER
EXTENSION OFFICER/PASTURES SUPPORT



CROCODILES AS FARM ANIMALS

Crocodiles are an unusual animal to farm, but successful farms have been established in Australia an in many other countries. Successful farms operate on sales of skins, meat, and some have tourism. Skins have long been valued as luxury goods, and tourism though relatively new has proven to be a very profitable aspect of crocodile farming. The meat of the crocodile has had a slow start; people either have fear of consuming the meat, or believe it to be illegal. Crocodile meat is legally sold all over the world. It is a white meat that is low in fat, and tastes great when marinated.

Commercial farming of crocodiles is now widespread, and most farms are very successful in their operations.

In the Northern Territory, saltwater crocodiles are the main animals farmed. Conditions that the animals are farmed under are influenced by their species, but most of the major farming conditions are the same.

For instance, hatchelling crocodiles are kept in pens that are maintained at a temperature of 32 degrees celsius. Growth rate and food intake depends greatly on body temperature. The need for seclusion is instinctive in crocodiles. Hatchlings must be given hide boards, or other opportunities to hide while temperature is still maintained. In pens with inadequate facilities, hatchlings may be smothered while trying to find seclusion. Most hatchling deaths can be indirectly related to incorrect temperatures and inadequate seclusion facilities.

As the crocodiles become yearlings, they become easier to care for. Temperature and seclusion are not so vital.

Yearlings and older crocodiles are placed in pens which have a certain degree of exposure to the environment. This enables the crocodiles to control their own body temperature by thermoregulation. They must be given the opportunity to bask in the sun or cool down in the shade or water.

The water must be clean, so it is drinkable and deep enough so they can submerge.

The density depends mainly on the space available. Correct density will reduce territorial tendencies, but not growth rate. Generally if space is available, six animals/m^2 is adequate.

The diet of the crocodile in the wild contains all the nutritional requirements needed. They will consume insects, birds, rodents, fish etc. In a captive environment it is not possible to supply such a wide range. Crocodiles are usually fed chicken heads and red meat with supplements. For maximum growth to be achieved, protein and calcium must be at a high level and fat as low as possible.

Generally, animals kept at optimum conditions will have few problems. There are however, problems that do occur, even in the best maintained farms.

Runts are hatchlings crocodiles for reasons yet unknown, stop eating, waste away and eventually die. Bacterial and fungal diseases also strike young crocodiles; it is thought that runting and disease are related in some way to the temperature.

Opportunistic bacteria and viruses as well as parasites and fungi will affect young and old crocodiles, if ideal conditions are not maintained.

Nutritional problems can be bone diseases due to lack of calcium, starvation, steatitis, and thiamine deficiency. Crocodiles are easily stressed, a simple disturbance to their routine can often result in no feeding for a few days and a resultant loss of production.

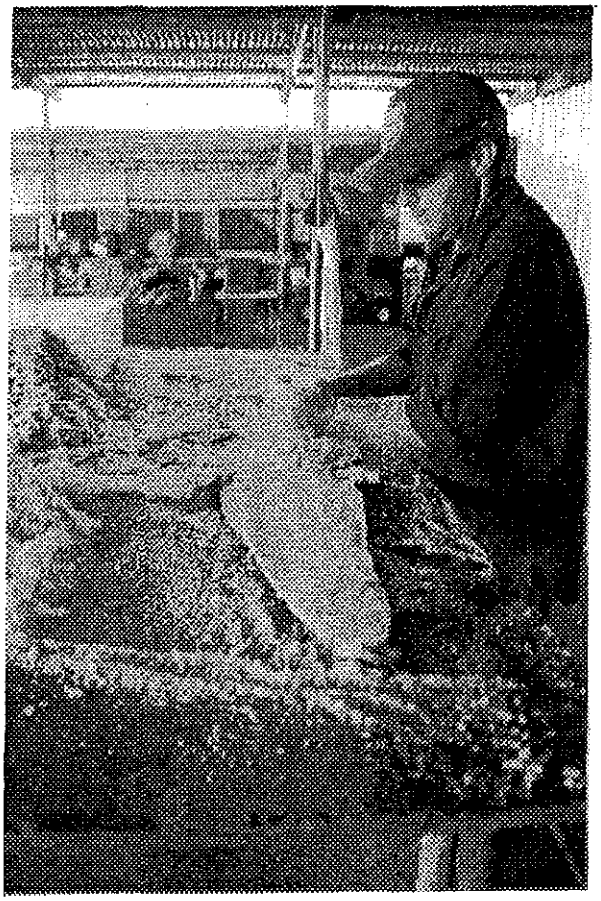
Crocodile farming is a relatively new industry, and our knowledge of crocodiles in captivity is limited. So Problems like these will continue to occur, until our knowledge and skills develop.

The economic viability of crocodile farming in the future is ensured. The market for crocodile products has great potential, and Australia's input is at a minimum level. As we learn and become more skilled, farming production will increase and so will Australia's participation in the crocodile market.

In all, there are seven crocodile farms in the Northern Territory with a total of over 30 000 animals.

Skins are sold by the centimetre and flesh by the kilogram. The value of the industry was over $2 million in the 1993/94 financial year.

VICKI SIMLESA
VET SERVICES



Salting Crocodile Hides

DRY SEASON HAY PRODUCTION UNDER IRRIGATION

There is increasing interest in producing dry season fodder under irrigation in the Top End. Despite the range of productive pastures available there is little information on how these pastures perform under irrigation in the dry season. Most of the Territory's hay is produced in the wet season however a number of people produce irrigated fodder.

Some of the questions which need to be answered with regard to irrigated fodder are

- which species will provide the best quantity and quality?
- what will it cost ie. water and fertiliser inputs?
- which species offers ease of management?
- what is the market for the fodder produced?

Legumes versus Grasses for Irrigated Production.

Due to the high light intensity, long days and relatively warm temperatures the production of irrigated fodder should be efficient. However, many of our pasture species especially legumes, do not grow well under dry-season conditions as they are not suited to low night time temperatures and the reduced day length. This means that legumes such as Cavalcade, Bundey, and Verano which are highly productive pastures in the wet-season are not good candidates for dry season irrigation.

At this point in time there does not seem to be a legume available which will provide viable yields for dry season production. Lucerne is possibly the only option and has been produced by a commercial operator in the past. However lucerne is a high management crop and the yields are relatively low but it is still the only legume suitable for dry-season irrigation in the Top End.

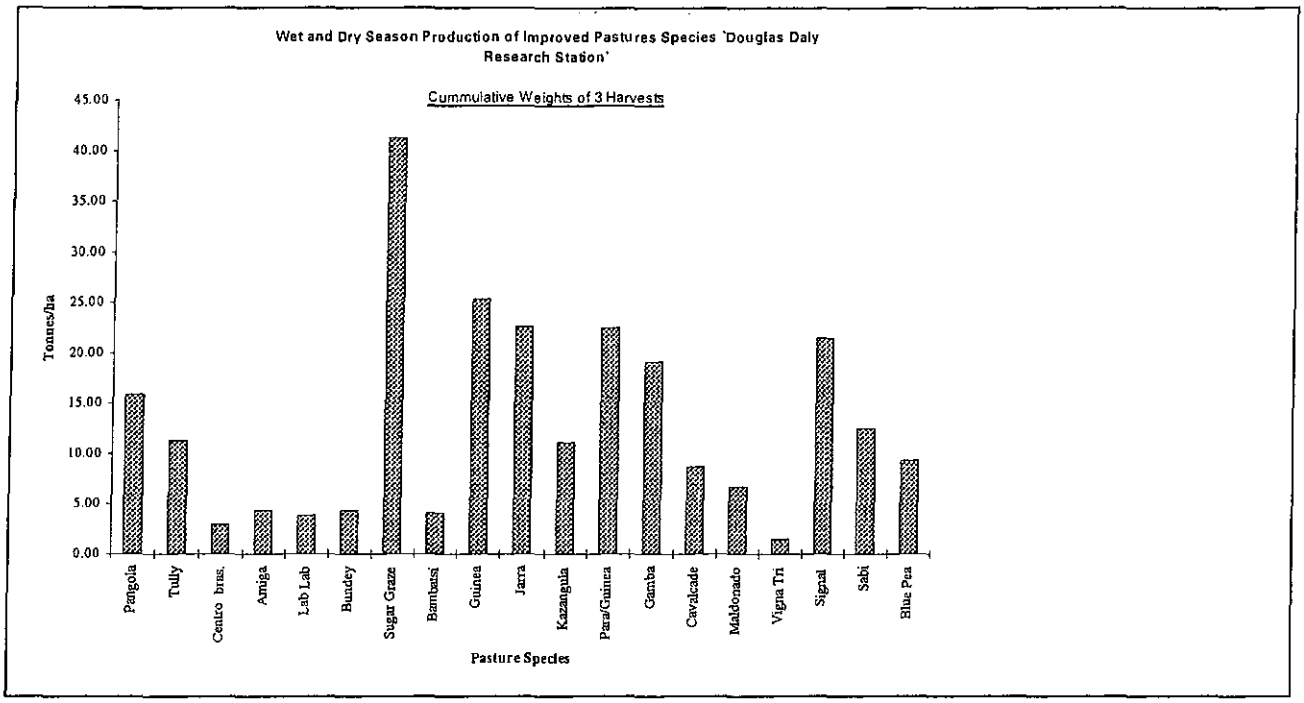
The most popular fodder for dry season production has been forage sorghum, due to the amount of bulk it produces. Up to four harvests can be achieved in a dry season under high fertiliser input.

In an attempt to find alternatives for forage sorghum an observation of 20 different pastures was conducted under irrigation on Blain soil at Douglas Daly Research Farm this season. A range of legumes and grasses were sown in the wet season and harvested in early April 1995. The pastures were fertilised and irrigated after harvest to determine their growth, production and quality through the dry season. The plots have been harvested on a two monthly basis (8 weeks). Quality analysis ie. nutrient content, crude protein and digestibility will be carried out for each pasture.

Points of significance so far from this observation are that

- forage sorghum (Sugar Graze) consistently produced the highest dry matter
- legumes produced low levels of dry matter in the dry season
- Jarra and Guinea grasses produced good levels of feed.
- Jarra produced higher dry-matter than Pangola under irrigation
- Grass pastures were more effective in suppressing weed growth than were legumes

Figure 1 shows the relative yields from the respective pastures in this observation. There will be at least one more harvest prior to the wet season and the measurements will be repeated next dry season. When all the information is available for this year it will then be possible to calculate approximate costs of production for each species.



Note: The initial wet season yields from all legumes were lower than would normally be expected due to delayed sowing in mid January. After initial wet-season harvest species were subsequently harvested if the production of dry-matter was sufficient.

Quality versus Quantity

Irrigation is an expensive form of production and requires high inputs and high management if profitable returns are to be realised. That's why it is necessary to select the best species for the particular situation. In fodder production there is a trade-off between quality and quantity. If the market does not pay for quality then it is advisable to aim for quantity. Legumes produce the best quality in terms of feed value however it is unfortunate that as yet, there is not a commercial tropical legume suitable for dry-season irrigation. Grasses such as Jarra and Guinea are showing promise and if nutrition and management is good then a high quality grass fodder can be produced.

This project is designed to build on our knowledge of existing pastures and develop different uses for them. If anyone would like to include a pasture for evaluation which they may feel has potential as an irrigated fodder please contact the Pastures Section in Darwin and we will arrange to have it included in this program. More irrigated pasture information to come !.

FERGAL O'GARA
PASTURE SECTION DARWIN

MODELS IN AGRICULTURE

With the advent of computers, there has been a greater ability to accumulate and handle much more research data in many more different ways. One of these uses of computers has been to develop computer simulation models. Simulation models are mathematical representations of processes which we see or measure in nature. These models have been developed for a wide range of scientific disciplines. Some mimic functions in the body, the weather, and in the case of agriculture, the growth of crops, pastures, and animals.

The ability to reproduce many aspects of agricultural production using a computer is now available for major crops on a range of soils and climates. Computer simulation models integrate information from research about crop growth and yield, soil fertility, soil erosion, climate and environment. This information is integrated by measuring relationships derived from field trials over many years on different soils and climates.
Figure 1 is an example of a relationship which is integrated in a simulation model.

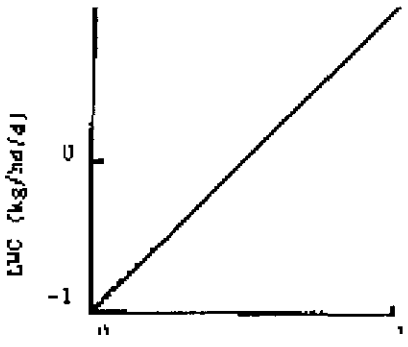


Figure 1: Example of a Relationship used in simulation models

Development of models rely on sound experimentation to provide a basic understanding of agricultural processes. When a computer model gives a prediction they look at real data (data other than that used to develop the model) and see how accurately the model is handling all the different interactions. If the real and predicted data agree one can have confidence in the model (Figure 2).

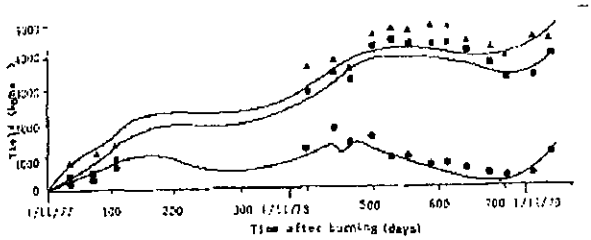


Figure 2: A response showing predicted values made by model and actual measured values (triangles, squares and circles).

Models linked with historical rainfall and other records can provide information on the long-term consequences and risks associated with a range of management options.

While farmers need to accumulate a lifetimes experience to have confidence in a course of action. They can more reliably interpret their own experiences against results provided by the model. Models can be used to assist in making short term decisions like which crop to grow and how much fertiliser to use, how to achieve sustainability and how to approach business decisions such as industry expansion. Animal production models can be used to estimate the reliability of individual feeding options with the particular types of animals. Commonly agricultural production models are used in conjunction with traditional methods to evaluate whether a production system can operate sustainably in a particular region.

Models are also useful as research tools as they allow for far more treatments than would be possible using conventional

field experimental techniques. They are able to cope with the inherent problems of research in variable climates. In addition models are useful to determine clearly what areas of research are deficient.

Finally and importantly, it must be emphasised that models are only a tool to assist in making decisions. Ultimately, there is no substitute for experience and the final decision rests with the user, whether that be a producer or a researcher.

DR MICHAEL BANGE

WARNING

CONTAMINATED HAY

Several reports have been received about the sale of contaminated hay from the Howard Springs area.

Mulching hay, heavily contaminated with the noxious weed Mission Grass (*Pennisetum polystachion*), is being sold. This may appear cheaper, but beware, it could lead to some very expensive problems.

Mission Grass is a vigorous perennial bunching species, growing up to 3 metres tall. It is an inferior introduced pasture grass which can be a severe fire hazard during the mid to late dry season. Control of Mission Grass is difficult due to its rapid growth and invasive nature.

Help prevent the spread of weeds — when buying

INSIST ON WEED-FREE HAY

For further information contact:
Department of Primary Industry
and Fisheries, Weeds Branch
Ph: (089) 992287.

DEPARTMENT OF
PRIMARY INDUSTRY
AND FISHERIES

SIDA MUNCHER IS ON THE WAY

To live on and within a *Sida acuta* plant is not everyone's idea of a good time, but for the Sida weevil, *Eutinobothris sp* its the perfect way to pass the time of day. *Eutinobothris sp.* is the second biological control agent released in the Top End to fight this tough fibrous weed. Trial sites were set up last year to determine wether it will readily establish.

So far, the results are encouraging with establishment at three out of the four sites. It is hoped that the site at Corroboree Park will be used as a collection site for future releases. In the meantime, the insect will continue to be reared in the laboratory. The life cycle of the insect is longer than that of the *Calligrapha* beetle, so it will not be as readily available from the Weeds Branch.

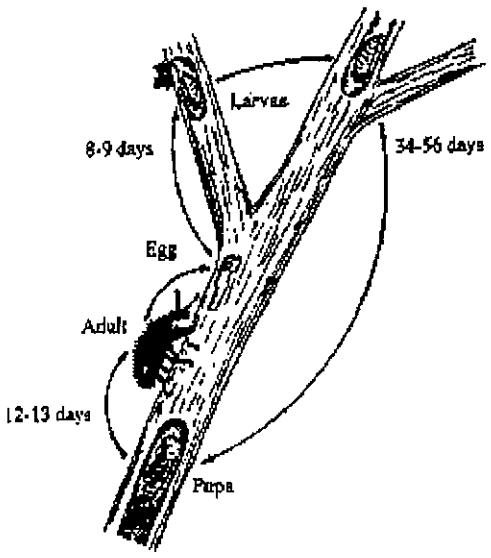
It is the larval stage of *Eutinobothris sp.* which contributes to the downfall of the weed. The damage that these larvae can cause is encouraging in the fight against this weed as they are tenacious feeders, hollowing out the central portion of the stems forming a "honeycomb" thus opening the way for other insects and diseases to enter.

Adult *Eutinobothris* weevils are only about 3 mm long and are coloured reddish-brown with a dark brown head. The adults graze on the bark, creating tiny depressions in which they lay their eggs. Upon hatching, the tiny larvae tunnel into the stem where they remain between 34-56 days.

After pupating, the adults chew their way out of the stem and the cycle begins again. The total life cycle ranges between 56-80 days.

During the dry months (April-September), the weevils remain in the stems in a state of diapause or non-activity as larvae, pupae or adults. During this time, it is advisable to leave an area of sida undisturbed so that the weevils remain ready to emerge at the beginning of the wet season. Plants re-shoot rapidly after the first rains and the adult weevils emerge and feed on the young growth. They should survive dry conditions more easily than the *Calligrapha* beetle.

LESLEE HILLS
BIO-CONTROL WEEDS BRANCH



Life Cycle of Eutinobothris sp. on Sida

CHANGES TO FARM MANAGEMENT BONDS (AS FROM 1/7/95)

Farm Management Bonds (FMBs) have been a component of the Income Equalisation Deposit (IED) Scheme since October 1992. The objective of the IED Scheme is to assist during periods of downturns. Changes to FMBs were made to the Federal Government in late 1994 and will become effective as from 1 July 1995.

Main features of the new FMBs will be as follows:

- The limit of the FMBs has been raised from the current $80 000 to $150 000 per producer/tax payer. This is a part of the overall $300 000 IED limit for each tax payer.

- Farmers will receive 100% interest on the deposit instead of 80% of the total as currently being applied.

- Only primary producers with non-farm income of less than $50 000 are eligible to make FMB deposits and only $10 000 non-farm income can be deposited in FMBs per year.

- FMBs may only be withdrawn on the grounds that the depositor is experiencing serious financial difficulties because of:

  a significant fall in commodity prices (average prices received in the year of withdrawal must be at least 25% lower than the average for the previous three (3) years);

  drought, disease, fire, flood or other natural disaster

- The penalty for withdrawing at other times will be that the investment component for the deposits withdrawn will revert back to the normal IED level of 61%.

- FMBs retrospectively revert to IEDs on retirement.

- No withholding tax is payable on the withdrawal of FMBs.

Compared with the current FMBs, new measures provide better benefits to producers. However, the most important factor which affects the value of the IEDs and FMBs is whether the farm is carrying a debt or not. For those producers with debts, the interest rate on borrowed funds are usually much higher than the short term Commonwealth Bond rate (which is currently around 9% - 10% per annum). In such situations, it could be better to pay the tax bill and use any surplus fund to reduce debt.

For primary producers who have positive cash flows and with no debt, returns from alternative investments, both on and off-farm (e.g. properties, share markets, managed mutual funds etc.), could be higher than IEDs or FMBs. However, risks may also be higher in certain cases, therefore one should be careful in choosing investment options so as not to expose oneself to financial ruin if a drought comes along.

For further information on IEDs and FMBs, please contact a DPIF Economist or Financial Assistance Officer in your region.

Huyn Ngo,
Economics Branch, DPIF - Darwin

INTERVAL BETWEEN SLAUGHTER AND TREATMENTS FOR CATTLE TICK

The Withholding Period (period between treatment and slaughter) is based on the Australian standards for maximum chemical residues in meat (Maximum Residue Limit MRL)

However, importing countries may have lower maximum standard or no standards at all if the chemical is not used. In the latter case, the detection of any of the chemical is a violation.

In 1993 there were detection of organochlorins and organophosphates in meat which exceeded the MRL in the United States.

Early in 1994 abattoirs imposed a 21 day period between slaughter for export and the last treatment for cattle tick or buffalo fly. This made it difficult for producers in the ticky area to send cattle for slaughter to abattoirs in Queensland and South Australia.

The Meat Research Corporation funded research to clarify appropriate intervals since tick and buffalo fly treatments prior to slaughter for export.

The research on buffalo fly treatments is incomplete. I will advise you later.

The table below lists minimum intervals between slaughter and the last treatment for the common cattle tick treatments used in the Northern Territory.

Tickicides	Export	Domestic
Taktic Dip	Nil	Nil
Bayticol Dip	Nil	Nil
Bayticol Pour-on	56 days	Nil
Barricade S	21 days	8 days
Cydectin Pour-on	Not Known	14 days

Chemical companies intend to apply a sticker to the labels to advise the interval prior to slaughter for export if it is different to the Australian withholding period.

With-holding Period for Cattle Worm Treatments

The withholding period for the common worm treatments are:

Ivomec Injection
42 days
Ivomec Pour-on
42 days
Cydectin Pour-on
14 days
Cydectin Injection
14 days
Nilverm Pour-on
3 days

Export Slaughter Intervals have not been set for the worm treatments.

ALWAYS READ THE LABEL AND COMPLY WITH WITHHOLDING PERIODS

BRIAN RADUNZ

TENDERBUFF PROJECT

It is time for reflection on what has been achieved in the Tenderbuff development program run by the Buffalo Industry Council in conjunction with DPIF.

There have been some notably successes:

1. Acceptance by the hospitality/butcher and catering trades in the local Darwin market of the Tenderbuff product and the recognition that it is completely different to the buffalo product available from export meatworks.

2. A consistent product can be achieved off grass in the Top End for most of the year, provided floodplain properties can provide stock in the late dry/early wet.

3. Some carcases have been sent to Victoria in an effort to help start a supply into southern markets. These have realised producers a gross return of $2.00 per kg liveweight. This equates to a range of $624-$915 per head for each end of the current Tenderbuff range. This is an excellent return and the BIC will seek to maximise this return whilst ensuring that the local market is supplied.

However, the main problem is supply of suitable animals. In 1994, we were unable to supply from October to December. This causes a break in supply and once it stops, some businesses are forced to take it of their menus. Once off, it then becomes a problem to get started again in the new year. Confidence in supply is very important in the local trade market. We need to aim to supply all year round.

To do this, requires some commitment from all local buffalo producers to the Tenderbuff market. The 20¢ per kg increase in the boat bull-to-Brunei price this year was to match the price achieved by Tenderbuff. If Tenderbuff does not continue, it is obvious what will happen to the boat prices. The BIC and DPIF therefore are encouraging producers to make sure both markets have sufficient supply for the future of the industry. Price competition needs to remain or producers can kiss the long term buffalo industry goodbye.

The essentials for Tenderbuff production are secure paddocks with good feed, not overstocked, preferably on improved pastures, with good young males drafted off from the rest of the herd so they are not bullied by older bulls or cows. A mix of upland and floodplain properties allows supply on a year round basis. If each producer in the Top End could commit 50 head per year for the next few years, then the Industry can only go from strength to strength. DPIF is willing to monitor progress of these groups and help achieve this goal. Please contact us if you think you will be able to help. It is in the long term interest of the buffalo industry and continuing good returns.

BARRY LEMCKE
DISTRICT AGRICULTURAL OFFICER

FERTILITY OF YELLOW EARTH SOILS IN THE DOUGLAS/DALY AREA

The yellow earth soils referred to here are a group of poorly drained soils which have limited trafficability in the wet season. They tend to be partially waterlogged and boggy, have a low surface water holding capacity and may contain high levels of gravel. They are not those yellow earths which may be associated with valley floors, drainage lines or alluvial levees.

These soils were most recently classified as yellow earths by Stuart Lucas of CCNT. They had previously been classified as yellow earths, yellow podzolics and lateritic podzolics.

These soils represent a significant proportion of the soils on each property in the Douglas/Daly area, including 23.2% of the A.D.M.A. acquisition area surveyed by Stuart Lucas.

Soil fertility studies in the Douglas/Daly area had been confined to the red earths which have been developed for cropping. It is expected that the yellow earths will be developed primarily for improved pastures. Little is known of the nutrient status of these soils, although responses to phosphorus and sulphur could be predicted from soil analyses, and available potassium and zinc levels appeared low in some soils.

Nutrient omission trials were conducted over four years in the early 1980's at ten sites on yellow earths in the Douglas Daly Region of the Northern Territory. The sites were on Kumbyechants (6) and Middle Creek Station (The Fleming Block, 4).

Verano (*Stylosanthes hamata*) was used as the test plant. The main response was to P and S. Over the 3 year period when the plots were harvested for dry matter, yields averaged 2 000 kg/ha without P and S, and 6 000 when the equivalent of 600 kg/ha of superphosphate had been applied. When P and S were supplied, zinc deficiency became limiting at two of the sites on Middle Creek Station. At these sites, yields were 20 and 31% higher where Zn was applied. Response to added zinc was associated with zinc levels less than 10 ppm in plant tops at harvest in early March. Omission of K, Cu or Mo had no effect on yield of Verano.

These soils are suitable for the growth of legume or mixed pastures with the application of only P and S fertilisers at 8 sites and Zn as well at the other 2. Potassium may be required in some of these soils if there is a high removal of plant material as hay.

ARTHUR CAMERON
PRINCIPAL PASTURES AGRONOMIST