BREEDING PERFORMANCE OF HEREFORD COWS GRAZING TROPICAL PASTURES AT BEERWAH, SOUTH-EAST QUEENSLAND

T. R. EVANS* AND J. BIGGS*

ABSTRACT

The breeding performance and calf growth rates of herds grazing either pangola grass pastures fertilized with nitrogen or mixed grass-legume pastures are reported for a five-year period. Stocking rates were 2.5 *breeders ha^{-1} on the nitrogen system and* 1.0 *breeders ha^{-1} on the grass-legume system. There were no significant differences in breeder or calf performance between pasture systems except in an abnormally dry year. Mean calving rates were* 94 *per cent on the nitrogen system and* 95 *per cent on grass-legume; weaning percentages were* 89 *and* 81 *per cent respectively. Weaning weights, corrected to a* 200*-day period were* 205.5 *kg on the nitrogen and* 192.0 *kg on the grass-legume system. Mean daily weight gains of calves from birth to* 200 *days were* 0.85 *kg and* 0.79 *kg for the nitrogen fertilized and grass-legume pastures respectively.*

INTRODUCTION

Beef cattle production from experiments on sown pastures at Beerwah in the coastal lowlands have been reported by Bryan (1968a, 1968b), Evans (1969), Bryan and Evans (1971) and Evans and Bryan (1973). These experiments showed that pasture production and its nutritive value were satisfactory for growing steers from 225 kg liveweight to a finished slaughter weight of 450 kg and that high levels of animal production could be achieved from adequately fertilized pastures. However, most of the pastoral development in the region involves breeding as well as growing and fattening beef cattle (Peart 1971). A problem with dystokia in some commercial herds appeared to be associated with pastures in which pangola grass was a major component. Previous research had been based on steer fattening and the study reported in this paper was undertaken to identify any major problems with breeding herds and to obtain data on breeder performance. It also served to establish whether pastures developed for beef fattening could satisfy the nutritional requirements for pregnant and lactating cows and pre-weaned calves.

Detailed investigations were considered unwarranted until problems had been identified and the study was therefore mainly observational and did not involve formal experimentation.

METHODS

Pastures and management

The pastures covered a range of soil types from well drained podzolics to humic gleys with seasonally high water tables. Two pasture systems were used; one was nitrogen fertilized pangola grass (*Digitaria decumbens*) which received 280 kg N a hectare each year in six equal applications. Ammonium nitrate was used until 1974 and urea thereafter. This pasture had received nitrogen and been grazed at 5.6 steers a hectare for the previous four years. The other was a grass-legume system with two to six year old pastures, some of which had been used in previous experiments. There were six paddocks ranging in area from 1.4 to 4.0 hectares, which were rotationally grazed to maintain approximately the same grazing pressure on all pastures. The system included paddocks of pangola with Greenleaf desmodium (*Desmodium intortum*) and white clover, *Paspalum dilatatum* with white clover and Kazungula or

* CSIRO, Division of Tropical Crops and Pastures, Cunningham Laboratory, Mill Road, St. Lucia, Qld. 4067.

Nandi setaria with Greenleaf desmodium and white clover. In the pangola and paspalum pastures, there was some invasion of *P. urvillei*, *Axonopus affinis* and *Eragrostis parviflora*. At the commencement of the herd comparison in 1972, legume content ranged from 5 to 20%, but botanical composition was not systematically recorded.

All pastures received annual maintenance fertilizer applications of 250 kg ha^{-1} superphosphate (9.6% P) and 63 kg ha^{-1} of potassium chloride in September.

The stocking rates chosen were based on results from experiments with steers; the optimum stocking rate on grass-legume pastures was approximately 1.6 steers ha^{-1} with a mean animal weight of 525 kg ha^{-1} $year^{-1}$. The equivalent weight per unit area for a cow and calf system equates to a stocking rate of 1.0 breeder a hectare on grass-legume pastures. A safe stocking rate for nitrogen fertilized pastures was two to two and a half times that of grass-legume pastures (Evans 1969, Bryan and Evans 1971), and on this basis the nitrogen fertilized system was stocked at 2.5 breeders a hectare.

Herd management

Hereford cows were transferred from the CSIRO Samford Pasture Research Station and consisted of pedigree and high grade cattle aged two to nine years. The two herds contained initially 20 and 19 head respectively and were increased to 25 in each after two years, by addition of heifers born at Beerwah. As herd numbers increased, stocking rates were maintained by the addition of further areas of similar pasture in each system. The herds were balanced for line and age. Bulls were replaced when their progeny entered the herd; mating occurred between November and January. Cows were culled for age and replaced with heifers, commencing at the 1973 mating; over the last three year period 15 heifers entered each herd. Cows were mated at Beerwah in November 1971 and the comparison between pasture systems commenced with the 1972 calving. Average liveweight of cows at mating was 450 kg and they were always in good condition. Cows had no history of infertility and each had raised calves in the two years prior to commencement of the pasture comparison.

Calves were weighed within twenty-four hours of birth and subsequently at monthly intervals until weaned at approximately seven months of age. No minerals or other supplements were fed.

RESULTS AND DISCUSSION

The climate of the coastal lowlands is subtropical with a marked dominance of summer rainfall. Thunderstorms and cyclones can contribute substantially to total annual rainfall (Coaldrake 1961) and rainfall distribution is extremely variable. During the five years of this pasture comparison, three years had well above mean annual rainfall and one was the second driest recorded over a twenty-one year period on the research station. Data in Table 1 present monthly rainfall over the period from birth to weaning which is also that of maximum pasture growth.

Breeding performance

Pasture system had no effect on calving or weaning percentage (Table 2); calving percentage refers to all calves born. In 1972 five calves were stillborn and subsequent blood tests on their dams together with samples from the rest of the herd proved that there was a high incidence of *Leptospira hardjo*. Although leptospirosis usually causes abortion within the last three months of pregnancy, these stillborn calves appeared to be full term. In succeeding years all cows were vaccinated against *L. hardjo*, but in 1973 five calves were again stillborn and we attribute this to the same cause.

Over the five-year period, 196 calves were weaned and only 12 deaths occurred, all within six weeks of birth. Assistance at calving was only required by a few cows that had calves with birthweights between 45 and 55 kg.

TABLE 1

Rainfall over the period of maximum pasture growth

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total for Period*	Annual Total
1972/73	7	277	214	60	266	394	108	77	1403	2173
1973/74	46	161	77	163	925	210	438	173	2193	2490
1974/75	47	100	327	28	197	99	60	145	1003	1211
1975/76	112	88	162	212	185	303	465	185	1712	2048
1976/77	41	84	152	33	190	169	187	63	919	1065
21 year mean	45	110	142	158	271	231	229	117	1285	1636

*Total rainfall September-August inclusive.

TABLE 2

Breeding performance of cows on two pasture systems

Year of Calving	Grass + Nitrogen			Grass-legume		
	No. of Breeders	Calving %	Weaning %	No. of Breeders	Calving %	Weaning %
1972	20	95	90	19	95	63
1973	20	100	90	20	95	70
1974	25	84	72	25	108*	104*
1975	25	100	100	25	88	80
1976	25	92	92	25	96	88

*Two sets of twins increase these percentages.

Calf performance

Calves were weaned in mid-April and in order to account for variation in age all weaning weights have been corrected to a 200-day period. The mean birthweight for the five years was 35 kg for male and 33 kg for female calves, and daily rates of gain were 0.84 kg for males and 0.80 kg for females. There was a general trend for calves to gain more weight on the nitrogen fertilized pasture (Table 3), and in the fifth year calf weaning weights were significantly heavier ($P < 0.01$) than those on grass-legume pastures.

This may represent a real difference emerging between the pastures but we consider this was probably due to differences in pasture growth in an abnormally dry year. A reduction in effective rainfall can reduce yield of legume and its nitrogen content (Jones *et al.* 1967) with consequent effects on pasture production. Rainfall in the 1974–75 season was also below average (Table 1) but weaning weights were higher than in 1976–77. However, rainfall in the early part of the growing season (September-December) was greater and there would have been less restriction to pasture growth. Although weaning weights of male calves were greater than for females in most years this difference was only significant ($P < 0.01$) in 1973–74 and 1974–75.

Calf liveweight gain is dependant on an adequate milk supply from the dam and the quality of pasture available to the calf as its grazing intake increases. An estimate of adequacy of milk production can be obtained by considering calf weight gains over sixty days from birth. In this period high rates of gain were recorded (Table 4) and it is unlikely that milk production limited calf growth. In the subsequent 140 days to weaning both groups showed a similar decline in rate of gain. Weight gains were not significantly different between the herds but were higher on nitrogen fertilized pasture.

The period covered in this study included years in which rainfall was well above average (Table 1), but this had no apparent adverse effect on animal production. However, Evans (1971, 1972), reported a marked effect on pasture growth and animal production in wet years for stocking rates in excess of 6.2 steers ha^{-1}. The major factor influencing production was inadequate pasture growth and not quality of feed supply. A survey of beef properties in the coastal lowlands (Ebersohn *et al.* 1973), found an adverse effect on calving percentages and animal production in abnormally wet years in areas of similar topography and soils to those at Beerwah. The major problems appeared to involve pasture and animal management, especially selection of stocking rates suitable for young pastures. Tierney (1973) suggested that poor pasture quality was a main factor influencing milk production of dams and calf performance in wet years. Problems of lactation anoestrus were attributed to poor quality pasture. Our results suggest that pasture quality even in very wet years was adequate for high levels of production, but the stocking rates were substantially lower

TABLE 3

Weaning weight (kg) and average daily liveweight gain (kg head^{-1}) of male and female calves

Year of birth	Nitrogen fertilized grass				Grass-legume				Standard errors for weaning weights	
	Male		Female		Male		Female			
	W.W.(1)	A.D.G.(2)	W.W.	A.D.G.	W.W.	A.D.G.	W.W.	A.D.G.	Pastures	Sex
1972	217	0.91	206	0.85	196	0.80	210	0.86	7.6	7.4
1973	217	0.90	189	0.77	196	0.80	179	0.74	8.0	8.0
1974	205	0.86	196	0.81	206	0.86	181	0.74	6.2	6.1
1975	210	0.87	197	0.81	195	0.79	192	0.78	6.3	6.3
1976	216	0.91	202	0.85	184	0.75	184	0.77	7.0	7.1
Mean	213	0.89	198	0.82	195	0.80	189	0.78		

(1) Weaning weight corrected to 200 days.
(2) Average daily gain.

TABLE 4

Mean birth weights (over 5 calf crops) and average daily weight gain (kg hd^{-1}) from birth to 60 days and from 60 to 200 days

Pasture	Sex	Birth Weight (kg)	A.D.G. (birth to 60 days)	A.D.G. (60-200 days)
Nitrogen Fertilized	Male	35.0	0.96	0.86
	Female	33.0	0.98	0.75
Mean		34.0	0.97	0.80
Legume Based	Male	35.4	0.89	0.76
	Female	33.6	0.86	0.74
Mean		34.5	0.87	0.75

than those reported by Tierney (1973) (6.2 breeders ha^{-1}) and this would have had a marked effect on quantity of feed available and the general levels of nutrition of the herd.

The study that we carried out involved only a small number of cows and was of relatively short duration. However, we consider that the results obtained confirm that pastures, developed for store cattle fattening, are adequate to sustain a breeding enterprise without a change in fertilizer or pasture management, and that the nutritional requirements can be met solely from pasture without any other supplementation.

ACKNOWLEDGEMENTS

We wish to express our thanks to the staff of the Beerwah Research Station for their help in cattle management and recording of data.

REFERENCES

Bryan, W. W. (1968a)—Grazing trials on the Wallum of south-eastern Queensland. 1. A comparison of four pastures. *Australian Journal of Experimental Agriculture and Animal Husbandry* **8**: 512-520.

Bryan, W. W. (1968b)—Grazing trials on the Wallum of south-eastern Queensland. 2. Complex mixtures under common grazing. *Australian Journal of Experimental Agriculture and Animal Husbandry* **8**: 683-690.

Bryan, W. W. and Evans, T. R. (1971)—A comparison of beef production from nitrogen fertilized pangola grass and from a pangola grass-legume pasture. *Tropical Grasslands* **5**: 89-98.

Coaldrake, J. E. (1961)—The Ecosystem of the Coastal Lowlands, ("Wallum") of Southern Queensland. CSIRO Australia Bulletin 283.

Ebersohn, J., Barrett, R., Bruce, R. and Dowsett, K. (1973)—A survey of ill-thrift in beef cattle in the southern coastal lowlands of south-east Queensland. *Tropical Grasslands* **7**: 352-357.

Evans, T. R. (1969)—Beef production from nitrogen-fertilized pangola grass (*Digitaria decumbens*) on the coastal lowlands of southern Queensland. *Australian Journal of Experimental Agriculture and Animal Husbandry* **9**: 282-286.

Evans, T. R. (1971)—CSIRO Division of Tropical Pastures, Annual Report 1970-71, p. 15.

Evans, T. R. (1972)—CSIRO Division of Tropical Pastures, Annual Report 1971-72, p. 9, 10.

Evans, T. R. and Bryan, W. W. (1973)—Effect of soils, fertilizers and stocking rates on pasture and beef production on the Wallum of south-eastern Queensland. 2. Animal response in terms of liveweight change and beef production. *Australian Journal of Experimental Agriculture and Animal Husbandry* **13**: 530-536.

Jones, R. J., Davies, J. G. and Waite, R. B. (1967)—The contribution of some tropical legumes to pasture yields of dry matter and nitrogen at Samford, south-eastern Queensland. *Australian Journal of Experimental Agriculture and Animal Husbandry* **7**: 57-65.

Peart, J. R. (1971)—A review of pasture development in the Wallum. *Tropical Grasslands* **5**: 43-45.

Tierney, T. J. (1973)—Breeder performance on wallum pasture. *Tropical Grasslands* **7**: 348-350.

(Accepted for publication June 15, 1979)