Tropical Animal Production 1982 7:43-49

THE EFFECT OF AGE AND SEASON OF INTRODUCTION ON THE LIVEWEIGHT PERFORMANCE OF STEERS IN THE WET TROPICS

P J Round, W Mellor[1] & M J Hibberd[2]

Department of Primary Industries, P O Box 931, Townsville, Australia

The performance of steers introduced to the wet coast of north Queensland as weaners, yearlings or two year olds from the drier hinterland was studied over five years. Introductions were made at different times of the year to test the effect of time of introduction.

Yearling and two year old cattle gained weight faster than weaners. Monthly liveweight changes were variable but tended to be lower during the period, May to August. Season of introduction had no significant effect on performance overall.

Key words: steers, growth rate, grass/legume pastures

Since the early 1960s large areas of the wet tropical lowland of north eastern Queensland (mean annual rainfall >2000mm) (Table 1) have been cleared and sown to grass-legume pastures (Teitzel et al 1974). Store cattle for fattening are obtained from the drier inland areas. Factual data are lacking on the optimum age and time of year to introduce these animals.

Alexander and Chester (1956) reported that store bullocks aged 2 to 3.5 years gained more slowly between May and August in this area than at other times. At another location Donaldson and Larkin (1963) observed that weaning weights of calves born between June and August were significantly higher than for those born between February and April. They suggested that wet season heat and humidity caused marked distress in cattle and considered there was a relationship between high rainfall and depressed growth.

This experiment was carried out at Utchee Creek, (which is situated on the wet tropical coast of northern Queensland), between 1968 and 1973. We compared the growth performance of steers introduced to the pastures at three different ages and at different times of the year.

Materials and Methods

The 'Utchee Creek' sub station of South Johnstone Research Station is approximately 32 km west of Innisfail, north Queensland, at latitude 17°36'S longitude 146°E. Forty two hectares of rainforest were cleared and sown to Guinea grass (*Panicum maximum*) and centro (*Centrosema pubescens*) during 1966 and 1967. Superphosphate was applied at planting at the rate of 250 kg/ha . There was one application of 59 kg/ha of muriate of potash. The area was divided into seven paddocks of six hectares.

[1] *Department of Primary Industries, South Johnstone Research Station, South Johnstone*

[2] *Formerly Department of Primary Industries, Innisfail; now Department of Lands, Sir Allen Fletcher Research Station, Brisbane.*

Table 1:
Monthly rainfall (mm) registrations at Utchee Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1968	753	NA	NA	NA	219	27	160	22	77	30	23	67	
1969	701	558	483	263	225	225	NA	NA	NA	NA	NA	NA	
1970	145	598	919	364	70	73	93	100	28	99	429	241	3159
1971	75	384	1436	697	37	65	52	39	13	83	65	78	3024
1972	682	864	894	214	306	158	14	35	158	0	50	64	3439
13 year mean	521	738	771	468	280	127	74	60	91	96	166	261	3653

NA = records not available

Brahman x Shorthorn steers (approximately 40-60% Brahman blood) were introduced as weaners, yearlings or two year olds from the drier hinterland around Charters Towers. Originally it was intended that all age groups be introduced twice a year before and after the wet season, and from the same sources. Because the different age groups reached target slaughter weights at different times, the original schedule had to be altered. Two year old introductions were deleted after four drafts. This allowed weaner introductions to be replicated. Details of times of introduction of the various age groups, sources of origin, initial weights, turn off dates and duration of grazing are shown in Table 2.

All groups were run separately at a basic stocking rate of 2.5 beasts/ha with a group size of 15 head, except that in an attempt to equate grazing pressure over all treatments, 20 weaners were introduced on each occasion. When total liveweight of weaner groups exceeded 5 000 kg, the heaviest five animals were removed. Paddocks were allocated to particular age groups and carried that class of animal throughout. Initial liveweights were recorded after a 3 to 4 day settling in period. Initial and final weights were the mean of unfasted weights taken on three consecutive days. Unfasted liveweights were recorded at monthly intervals throughout the study. Most groups were removed when it was estimated that mean carcass weights would be 200-240 kg, but some groups were retained until they reached an estimated 260-280 kg carcass weight. All stock were slaughtered when removed and carcass weights measured. Dressing percentages were calculated from cold dressed weight and unfasted liveweight.

Liveweight data for the three age groups for the periods August to December 1968, January to June 1969, August 1969 to February 1970 and March to August 1970 were analysed by analysis of variance techniques. Animals of the different age groups from the same source were introduced at the beginning of each of these periods. Correlations between carcass weight and dressing percentage were calculated for the different age groups.

Table 2:
Date of introduction, source of origin, date of turnoff, length of grazing period and performance of various groups of animals

Class of stock	Draft number	Initial liveweight kg	Source of origin	Date introduced	Date turned off	Days on trial	Average daily gain per day kg
Weaners	1	187	A	Aug 68	Oct 69	399	0.58
	2	196	A	Jan 69	Feb 70	399	0.57
	3*	169	A	Aug 69	Feb 70	156	0.48
	4	147	A	Oct 69	Dec 70	434	0.47
	5	175	B	Mar 70	Jun 71	474	0.63
	6	177	C	Jul 70	Dec 71	517	0.51
	7	177	D	Jul 70	Jul 72	737	0.45
	8	189	E	Jan 71	Jul 72	536	0.47
	9	190	E	Jan 71	Mar 73	766	0.43
	Mean	179				491	0.52
Yearlings	1	294	A	Aug 68	Mar 69	212	0.81
	2	306	A	Jan 69	Aug 69	224	0.83
	3	300	F	Mar 69	Dec 69	250	0.54
	4	234	A	Oct 69	Aug 70	320	0.51
	5	257	B	Dec 69	Aug 70	249	0.67
	6	261	D	Aug 70	Jan 72	143	0.55
	Mean	275				233	0.65
Two year olds	1	347	A	Aug 68	Dec 68	114	0.76
	2	364	A	Jan 69	Jul 69	173	0.81
	3	360	A	Aug 69	Feb 70	175	0.69
	4	325	B	Mar 70	Sep 70	189	0.70
	Mean	349				163	0.74

* An interim group only

Results

Monthly rainfall registrations at Utchee Creek during the course of the study and the 13 year mean (Table 1) show that the period was slightly drier than normal.

Age at which animals were introduced had a marked effect on liveweight performance. Weaners gained at a slower rate than either yearlings or two year olds ($P<0.01$; Tables 2, 3). There was no difference in rate of gain of the two older categories. Rate of gain of animals declined as their time on the pasture increased. Animals introduced as weaners were fat enough to market at lighter weights than those introduced as yearlings or two year olds. Times to reach market condition were 13-18 months for weaners, 8-9 months for yearlings and 4-7 months for two year olds.

Table 3:
Differences in daily liveweight gains of weaners, yearlings and two year olds from same source of origin

Group	Period			
	Aug 68–Dec 68	Jan 69–Jun 69	Aug 69–Feb 70	Mar 70–Aug 70
Initial weight (kg)				
Weaners	184.0[a†]	185.4[a]	161.7[a]	-
Yearlings	291.8[b]	307.4[b]	256.4[b]	309.4[a]
Two year olds	349.2[c]	363.7[c]	358.9[c]	324.6[b]
S.D.	23.7	26.2	25.2	16.7
Final weight (kg)				
Weaners	254.0[a]	289.6[a]	250.9[a]	-
Yearlings	376.1[b]	437.0[b]	346.2[b]	400.8[a]
Two year olds	434.7[c]	500.4[c]	478.0[c]	442.2[b]
S.D.	27.1	27.0	30.9	22.8
Average daily gain (kg)				
Weaners	0.62[a]	0.64[a]	0.50[a]	-
Yearlings	0.75[b]	0.79[b]	0.69[b]	0.54[a]
Two year olds	0.76[b]	0.84[b]	0.68[b]	0.71[b]
S.D.	0.12	0.10	0.10	0.11

All means based on 15 observations except first period weaners (20)
† Means, within a variable and period, without a common letter are different ($P<0.01$)

Season of introduction had no significant effect on overall performance of any age group. Liveweight changes varied with season with lowest gains between May and August.

Dressing percentages varied between and within age groups (Table 4 4). In yearlings and two year olds, dressing percentage and final carcass weight were positively correlated ($r = 0.82$ and 0.86).

There was little evidence of a change in pasture composition during the experiment, with the legume content being generally 3 to 5%. The quantity of pasture on offer declined during the winter-spring months, but did not fall sufficiently to limit feed intake.

Discussion

Overall rates of gain in this study were similar to those reported by Mellor and Round (1974) for grass-legume pastures in the area. Age

Table 4:
Final liveweight, cold carcass weight and dressing percentage of various groups of animals

Class of stock	Draft number	Final liveweight (kg)	Cold carcass weight (kg)	Dressing %
Weaners	1	418.8	212.8	50.8
	2	413.0	217.4	52.6
	3	397.0	206.7	52.1
	4	376.1	191.9	51.0
	5	257.7	+NA	+NA
	6	505.0	258.4	51.[illegible]
	7	446.8	222.2	49.[illegible]
	8	519.1	267.8	51.[illegible]
	9	422.3	+NA	+[illegible]
Yearlings	1	444.4	247.6	55.[illegible]
	2	459.1	245.6	53 [illegible]
	3	434.1	234.8	54 [illegible]
	4	420.9	227.5	54.2
	5	401.7	206.1	51.3
	6	517.3	+NA	+NA
Two year olds	1	440.9	233.1	52.9
	2	505.5	274.8	54.5
	3	478.6	261.9	54.8
	4	443.2	223.0	50.3

+NA = Information not available

at introduction had the greatest effect on individual animal performance with yearling and two year old steers outperforming weaners. Sutherland (1959) reported that yearling steers gained more weight than weaners between August and April on spear grass pastures at 'Brian Pastures', Gayndah. He suggested that the growth of weaners is affected more than yearlings because unimproved pastures are deficient in the major food nutrients, particularly protein, and have a low palatability and digestibility. This would be exacerbated by the higher protein requirement of weaners.

We consider that the superior performance of the older animals in our study is largely a function of compensatory growth. Animals grazing native pastures in north Queensland undergo a seasonal pattern of growth with weight gains during the spring-summer-autumn period and maintenance or weight loss during winter-early spring (Alexander and Chester 1956).

The older steers in our study would have suffered periods of weight loss while grazing native pastures but weaners would have suffered less, largely because of the cushioning effects of suckling. The older animals would have been further from their potential yearling or two year old weight than the weaners were from their potential weaning weight. When placed on high quality pasture they tended to compensate for the previous periods of sub-optimal growth (Allden 1970).

Despite the superior individual gains of the older animals, total production per unit area was only slightly in favour of the older groups because of the additional number of weaners carried in the period following introduction.

The lower performance of animals between May and August supports the earlier reports of Alexander and Chester (1956), Mellor *et al* (1973) and Mellor and Round (1974). Low quality mature pasture, leaching of soil minerals during the wet season and seasonally low legume content of pastures are possible reasons for the poorer performance at this time. The failure of the time of introduction to affect overall animal performance indicates that animals compensated subsequently for the lower gains recorded during the winter.

Studies of this nature are always subject to criticism as there is always some doubt how representative the test animals are of the cattle available for fattening, and how pre-test history affected the results. Although different age groups in any one year were not always drawn from the same property, relativity between the age groups remained constant. We consider that sufficient animals drawn from different sources (Table 2) have been tested to give substance to the general findings. Similar results should apply with other Brahman crossbred steers introduced to the wet coast of Queensland at different times throughout the year. In addition, we consider that our results would probably be relevant in other tropical countries, where cattle from less favourable areas are fattened on tropical grass-legume pastures.

A decision on which age-group of animal to purchase for fattening should take into account the longer turnover time with weaners relative to yearlings and two year olds, the possible higher purchase price per unit of carcase weight with weaners, and the greater freight and other associated costs for older groups. The tendency for younger animals to reach marketable condition at lighter weights than those introduced as yearlings or two year olds gives this class more flexibility as they are more suited to local trade requirements but can still be retained for the export market.

Acknowledgements

The authors gratefully acknowledge the efforts of M A Burns who administered the project in its early stages of development, L G Andrews, Bureau of Animal Health, Canberra, and M A Toleman, Department of Primary Industries, Townsville, who analysed the data and P B Hodge, Department of Primary Industries, Townsville, who assisted in preparation of the paper. Financial assistance was provided by the Australian Meat Research Committee.

References

Alexander G I & Chester R D 1956 Growth studies of beef cattle in Queensland Queensland Journal of Agricultural Science 13:69-95

Allden W G 1970 The effects of nutritional deprivation on the subsequent productivity of sheep and cattle Nutrition Abstracts and Reviews 40:1167-1184

Donaldson L E & Larkin R M 1963 Observations on time of calving and growth to weaning of beef calves in coastal north Queensland Queensland Journal of Agricultural Science 20:199-202

Mellor W, Hibbard M J & Grof B 1973 Beef cattle liveweight gains from mixed pastures of some guinea grasses and legumes on the wet tropical coast of Queensland Queensland Journal of Agricultural and Animal Science 30:259-266

Mellor W & Round P J 1974 Beef production on wet tropical pastures Queensland Journal of Agricultural and Animal Science 31:213-220

Sutherland D N 1959 Factors affecting the performance of beef cattle on unimproved pastures in Queensland Australian Veterinary Journal 35:129-134

Teitzel J K, Abbot R A & Mellor W 1974 Beef cattle pastures in the wet tropics Part 1 Queensland Agricultural Journal 100:98-105

Received 8 December 1981