Performance of beef steers on Smuts finger grass and Nile grass pasture in northern Natal

1. Effect of overwintering level and summer stocking rate

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In each of three consecutive years (1987/88 to 1989/90), 108 weaner steers (average live mass = 192.5 and standard deviation = 1.9 kg) were divided into three groups of 36 steers and fed to achieve growth rates of 0, 0.3 and 0.6 kg/steer/day during winter. During the subsequent summer, the steers from each wintering level were subdivided into six groups of six steers each, which grazed either Smuts finger grass (*Digitaria eriantha* spp *eriantha*) or Nile grass (*Acroceras macrum*) pastures, each at one of three stocking rates (6, 8 and 10 steers/ha). Rotational grazing was applied. On average, steers subjected to wintering levels of 0, 0.3 and 0.6 kg/day subsequently gained 47.1 ± 1.7, 38.2 ± 2.1 and 34.9 ± 2.2 kg/steer on Smuts finger grass and 63.5 ± 2.2, 55.7 ± 2.3 and 42.8 ± 2.7 kg/steer on Nile grass pasture over a 90-day grazing period. Steers subjected to stocking rates of 6, 8 and 10 steers/ha gained 45.1 ± 2.0, 39.2 ± 1.8 and 35.8 ± 2.4 kg/steer on Smuts finger grass and 61.8 ± 2.1, 58.7 ± 2.2 and 41.6 ± 2.8 kg/steer on Nile grass. Prediction equations for summer live mass gain and final live mass were calculated. For all treatments, steers had better live mass gains when grazing Nile grass than when grazing Smuts finger grass [54.0 ± 1.5 and 40.0 ± 1.2 kg ($P \leq 0.01$), respectively]. It was not clear whether the higher summer growth-rate on both pastures in animals wintered at maintenance was due to compensatory growth or to relatively more grass/kg live weight being available to the lighter animals.

Speenosse (drie groepe van 36 osse elk; gemiddelde lewende massa = 192.5 en standaardafwyking = 1.9 kg) is oor 'n periode van drie opeenvolgende jare (1987/88 tot 1989/90) gevoer om groeitempo's van 0, 0.3 and 0.6 kg/dag gedurende die winter te behaal. Gedurende die daaropvolgende somer is die osse, afkomstig van elkeen van die oorwinteringspeile, verdeel in ses groepe van ses osse elk en het hulle óf Smutsvingergras (*Digitaria eriantha* spp *eriantha*) óf Nylgras (*Acroceras macrum*) bewei, elkeen teen een van drie veebeladings (6, 8 en 10 osse/ha). Wisselweiding is toegepas. Oor die jare het osse met wintergroeitempos van 0, 0.3 en 0.6 kg/dag, massatoenames van 47.1 ± 1.7, 38.2 ± 2.1 en 34.9 ± 2.2 kg/os op Smutsvingergras- en 63.5 ± 2.2, 55.7 ± 2.3 en 42.8 ± 2.7 kg/os op Nylgrasweiding oor 'n weiperiode van 90 dae behaal. Osse wat aan veebeladings van 6, 8 en 10 osse/ha onderwerp was, het massatoenames van 45.1 ± 2.0, 39.2 ± 1.8 en 35.8 ± 2.4 kg/os op Smutsvingergras en 61.8 ± 2.1, 58.7 ± 2.2 en 41.6 ± 2.8 kg op Nylgras gehad. Voorspellingsvergelykings is bereken vir lewendemassa-toename oor die somerperiode en vir finale massa. Oor alle behandelings het osse groter lewendemassa-toenames op Nylgrasweiding as op Smutsvingergrasweiding getoon [54.0 ± 1.5 en 40.0 ± 1.2 kg ($P \leq 0.01$), onderskeidelik]. Dit was onduidelik of die diere, wat teen onderhoud oorwinter is, se hoër somergroei op albei weidings toegeskryf kon word aan kompensatoriese groei of dat dit die gevolg van relatief meer gras beskikbaar aan die ligter diere was.

Keywords: Live mass gain, stocking rate, subtropical pastures.

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Introduction

Owing to limited irrigation potential, beef producers using cultivated pasture in the Natal Sour Sandveld (Acocks, 1988), are limited to dryland summer pastures. At the Dundee Research Station (altitude 1219 m; latitude 28° 10' S; longitude 30° 19' E), where the trial was conducted, the winters are dry and the summer rainfall (777.3 ± 150.6 mm/annum) is relatively low and erratic.

A number of surveys and studies have indicated that both Smuts finger grass and Nile grass have good production potential for most of the beef producing areas of Natal (Theron & Arnott, 1979; Brockett & Gray, 1984). However, production norms for pastures are scarce (Pieterse *et al.*, 1988) and are usually based on small-plot trials (Jones & Bartholomew, 1973; Grunow *et al.*, 1977; Grunow & Rabie, 1985). Rarely do animals grazing pasture achieve their genetic potential for production (Black, 1990), making it essential to test grass species under grazing conditions (Adjei *et al.*, 1980).

Compensatory growth, the ability of animals to show enhanced growth following a period of restricted feeding (Wright & Russel, 1991), is well documented (O'Donovan, 1984) and has been acknowledged for many years (Wright & Russel, 1991). Wright & Russel (1991) reviewed results by a number of researchers and concluded that many causes for compensatory growth exist, which include reduced maintenance requirements, increased food intake and changes in the weight and composition of body organs and tissues.

The objective of this trial was to evaluate the production potential of Smuts finger grass (*Digitaria eriantha* spp *eriantha*) and Nile grass (*Acroceras macrum*) for growing steers and the determination of the effect of winter treatment on steer performance while grazing these pastures during the following summer.

Experimental procedure

Livestock management

Annually, for three consecutive years (1987/88 to 1989/90), 108 weaner steers (192.5 ± 1.9 kg mean initial live mass) were bought during autumn. The steers were of mixed descent and appeared to include Brahman, Afrikander, Simmentaler and Sussex in their ancestry. On arrival, the steers were dewormed, dipped and inoculated against anthrax, quarter evil and botulism. They were randomly allocated to three groups of 36 steers each and the groups subjected to winter treatments of feeding in a feedlot to achieve target growth rates of 0 (maintenance), 0.3 and 0.6 kg/steer/day (W0, W1 and W2, respectively).

During the ensuing summer, steers subjected to each wintering level were randomized into six groups of six steers each. Groups were randomly allocated to either Smuts finger grass or Nile grass pastures, each at one of three stocking rates (SRs), namely six (light stocking rate; LSR), eight (medium stocking rate; MSR) and ten (heavy stocking rate; HSR) steers/ha. The SRs were achieved by allocating areas of 1, 0.75 and 0.6 ha to the respective groups of steers.

Initial and final live mass were recorded without prior fasting as well as after the removal of food and water for 18 hours. The steers were weighed fortnightly without prior fasting throughout the trial period.

Steers were dewormed again at mid-winter and at the commencement of summer grazing, and they were dipped once every three weeks. A lick consisting of 50% salt and 50% dicalcium phosphate was supplied *ad libitum* throughout the summer grazing period.

The steers were marketed through the abattoir (Cato Ridge) after the 1987/88 summer season. In subsequent years the steers were finished in a feedlot prior to slaughter.

Pasture management

Smuts finger grass and Nile grass pastures were established under dryland conditions on soils classified as Longlands (MacVicar *et al.*, 1977). Pastures were established during February 1983 and used as foggage for three years prior to their use as summer grazing in this trial.

At establishment, superphosphate (10.5% P) and potassium chloride (KCl; 50% K) were applied to achieve soil P and K levels of 20 and 150 mg/*l*, respectively. Subsequently these levels were maintained with annual fertilizer applications during September.

After establishment, when the pastures had grown out to a height of 100 mm, limestone ammonium nitrate (LAN, 28%) was applied at 150 kg N/ha. Thereafter three annual applications of LAN over the growing season supplied 75 kg N/ha per application. The first LAN was applied at the end of September, the second in the middle of December and the third at the beginning of February.

Grazing commenced when the pasture had grown to a height of 100 mm and was terminated when steers failed to gain weight over two consecutive weighings, except during the 1988/89 season when grazing was terminated at 90 days in all treatments due to poor animal condition. Because of the premature termination of grazing in the second year of the trial, treatments were compared after 90 grazing days, except for the number of grazing days which were calculated as the mean of two seasons, 1987/88 and 1989/90.

The paddocks in the respective pastures were randomly allocated to the respective treatments at the outset and were subjected to the same treatment (i.e. were grazed at the same SR by steers subjected to the same winter treatment) for the remainder of the trial. Rotational grazing was applied by subdividing the paddocks allocated to the respective summer treatments into six sub-paddocks of equal size by means of electric fencing. Each sub-paddock was grazed for one week and rested for five weeks.

During the 1987/88 and 1988/89 seasons, pasture yields were determined using exclusion cages. The data of disc meter readings taken to determine the amount of grass available for grazing were discarded because of the poor relationship between the disc meter readings and amount of herbage remaining on the pastures.

Determining number of grazing days

For the 1987/88 and 1989/90 seasons, examination of the plot of live mass against time showed that in most treatments live mass increased in two phases, that is, an initial period of mass gain, followed by a second period during which live mass remained relatively constant. It was therefore decided that grazing days would be taken as ended when steer live mass gain peaked in each individual treatment. In those treatments where steers were still gaining mass at the termination of grazing, peak live mass was taken at and grazing days calculated until termination of grazing. As a means to determine that date at which peak live mass was reached in an objective manner, a 'bent stick' regression analysis was used (Draper & Smith, 1966). Peak live mass was taken as the mean mass of steers in a treatment on the date corresponding to the inflection point of live mass on grazing days in the relevant treatment. The inflection point was defined as the intersection of the linear regressions for the first and second phases of the regression of live mass (full fed) on grazing days, where the second linear regression of a pair of regressions had a slope of less than 0.01.

Statistical analysis

The treatment design was factorial and included the factors wintering level, pasture and SR, providing a $3 \times 2 \times 3$ factorial arrangement.

A multifactor analysis of variance, taking years as 'blocks', was used to compare live mass gain (Gain90), live mass (LM90), and total live mass gain (winter + summer; TG) after 90 days of grazing.

Multiple regression analysis was used to obtain prediction equations for Gain90 and LM90 for the respective pastures.

Results

Winter treatment

Winter feeding commenced on 10 July, 12 July and 5 July and was terminated on 11 November, 6 December and 28 November for the 1987/88, 1988/89 and 1989/90 seasons, giving feeding periods of 124, 147 and 146 days, respectively.

For the groups of steers set target winter growth rates of 0, 0.3 and 0.6 kg/day, the actual respective growth rates were 0.086 ± 0.010, 0.307 ± 0.012 and 0.571 ± 0.013 kg/day. The winter ration consisted of maize silage, maize meal and poultry litter and the amounts fed are summarized in Table 1.

Rainfall and dry-matter (DM) production

The total rainfall was 902.7, 895.4 and 643.7 mm for the first, second and third years of the trial respectively.

During the 1988/89 season, an above-average precipitation

Table 1 Total feed provided per steer (as fed) during the wintering phase to achieve target growth rates of 0, 0.3 and 0.6 kg/day (average for 3 consecutive years)

Target winter ADG (kg/day)	Actual winter ADG * (kg/day)	Maize silage (kg)	Poultry litter (kg)	Maize meal (kg)
0	0.086 ± 0.010	1164.0	140.5	
0.3	0.307 ± 0.012	1427.9	145.2	69.3
0.6	0.571 ± 0.013	1386.8	157.1	268.5

* Mean feeding days over the winter period = 139 days

during December, January and February (636.5 mm compared to 437.6 and 424.1 mm for the 1987/88 and 1989/90 seasons respectively), which was associated with intermittent cold spells (personal observation — P.W. van H. Henning), was blamed for rapid pasture growth over a relatively short growing season. After 90 days of grazing, the steers lost mass rapidly despite the availability of considerable quantities of grass in the grazing camps. It was therefore decided to stop grazing after 90 days.

During the 1987/88 season the Smuts finger grass and Nile grass pasture yields were measured as 12 340 and 11 980 kg DM/ha respectively. During the 1988/89 season the pastures yielded 7 960 and 8 790 kg DM/ha, respectively. Pasture yield was not measured during the 1989/90 season.

Duration of grazing

Summer grazing commenced on 12 November, 7 December and 1 December. On Smuts finger grass 119, 112 and 116 grazing days were achieved compared to 131, 124 and 109 grazing days on Nile grass, for the LSR, MSR and HSRs, respectively.

Treatment effects

Gain90 in steers grazing Smuts finger grass was 45.1, 39.2 and 35.8 kg/steer for the LSR, MSR and HSR treatments respectively. The equavalent live mass gains for Nile grass were 61.8, 58.7 and 41.6 kg/steer respectively (Table 2).

Gain90 declined as winter growth rate increased from 47.1 and 63.5 kg/steer for the W0 treatment to 34.9 and 42.8 kg/steer for the W2 treatment in steers grazing Smuts finger grass and Nile grass, respectively (Table 2). In spite of the lower Gain90 at higher winter growth rates, TG was higher at higher winter growth rates (Table 3) and consequently LM90 followed the same pattern when comparing the effect of winter treatment (Table 4). A higher SR was associated with a lower TG/steer (Table 3).

Table 2 Summer live mass gain (Gain90) in steers subjected to target winter growth rates of 0, 0.3 and 0.6 kg/day (W0, W1 and W2) and grazing Smuts finger grass and Nile grass pastures during the following summer at 6, 8 and 10 steers/ha (LSR, MSR and HSR)

	Gain90 (kg)					
	Winter treatment			Stocking rate		
	W0	W1	W2	LSR	MSR	HSR
Smuts finger grass	47.1	38.2	34.9	45.1	39.2	35.8
Nile grass	63.5	55.7	42.8	61.8	58.7	41.6

Standard error of a mean is 1.68; LSD is 4.9 (5%) and 6.5 (1%)

Live mass gain was significantly greater ($P \leq 0.01$) in steers grazing Nile grass than in steers grazing Smuts finger grass (54.0 ± 1.5 vs. 40.0 ± 1.2 kg at 90 days, respectively). The respective growth rates were 0.600 ± 0.017 kg/day and 0.445 ± 0.014 kg/day.

A significant interaction ($P \leq 0.01$) between SR and pasture was observed. This is displayed in Figure 1. The interaction between pasture and winter treatment as well as between SR and winter treatment was significant ($P \leq 0.01$).

Prediction equations

Prediction equations were calculated for Gain90 and LM90, taking winter growth rate, initial mass (for LM90 only), SR and total rain (mm) that fell during November, December, January and February into consideration:

$$\text{Gain90 (Smuts finger grass)} = 68.5(\pm 48.0) - 30.78(\pm 3.12)\,a_1 + .0590(\pm 0.0066)\,a_2 - 9.71(\pm 8.78)\,a_3 + .458(\pm 0.548)\,a_4$$
$$(R^2 = 52.9;\ n = 322)$$

and

$$\text{Gain90 (Nile grass)} = -33.7(\pm 34.0) - 30.78(\pm 3.12)\,a_1 + .0590(\pm 0.0066)\,a_2 + 23.55(\pm 8.74)\,a_3 - 1.787(\pm 0.545)\,a_4$$
$$(R^2 = 52.9;\ n = 322)$$

Table 3 Total live mass gain (winter + summer gain; TG) in steers subjected to target winter growth rates of 0, 0.3 and 0.6 kg/day (W0, W1 and W2) and grazing Smuts finger grass and Nile grass pastures during the following summer at 6, 8 and 10 steers/ha (LSR, MSR and HSR)

	TG (kg)					
	Winter treatment			Stocking rate		
	W0	W1	W2	LSR	MSR	HSR
Smuts finger grass	57.7	80.3	114.2	90.2	81.7	80.3
Nile grass	76.5	98.6	122.2	107.1	103.8	86.4

Standard error of a mean is 2.60; LSD is 7.3 (5%) and 9.8 (1%)

Table 4 Final live mass (LM90) in steers subjected to target winter growth rates of 0, 0.3 and 0.6 kg/day (W0, W1 and W2) and grazing Smuts finger grass and Nile grass pastures during the following summer at 6, 8 and 10 steers/ha (LSR, MSR and HSR)

	LM90 (kg)		
	Winter treatment		
	W0	W1	W2
Smuts finger grass	249.8	273.2	307.4
Nile grass	268.7	291.0	314.7

Standard error of a mean is 5.90; LSD is 16.1 (5%) and 21.4 (1%)

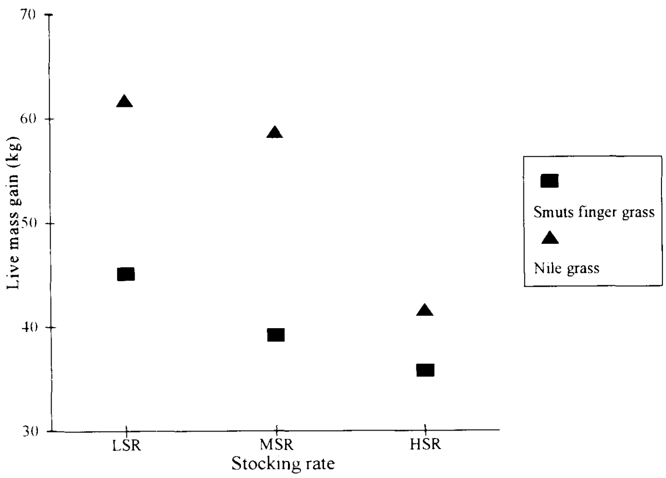

Figure 1 Live mass gain in steers grazing Smuts finger grass and Nile grass pastures at 6 (LSR), 8 (MSR) and 10 (HSR) steers/ha after 90 grazing days

$$\text{LM90 (Smuts finger grass)} = 57.5(\pm 48.9) + 108.8(\pm 3.2)\, a_1 + .0775(\pm 0.0067)\, a_2 - 9.17(\pm 8.97)\, a_3 + .428(\pm 0.559)\, a_4 + .9962(\pm 0.0232)\, a_5$$
$$(R^2 = 92.1;\ n = 322)$$

and

$$\text{LM90 (Nile grass)} = -42.8\,(\pm 35.0) + 108.8\,(\pm 3.2)\, a_1 + .0775\,(\pm 0.0067)\, a_2 + 23.67(\pm 8.92)\, a_3 - 1.791(\pm 0.556)\, a_4 + .9962(\pm 0.0232)\, a_5$$
$$(R^2 = 92.1;\ n = 322)$$

where:

a_1 = Winter ADG (0, 0.3 or 0.6), a_2 = Rain (total mm for November, December, January and February), a_3 = SR (6, 8 or 10), a_4 = SR^2 (6^2, 8^2 or 10^2) and a_5 = Initial live mass (kg).

Carcass grades

At commencement of summer grazing, all steers were graded on the hoof by an experienced stockman and the conclusion was that all would have graded A3 (A1 in the carcass classification system of 1992) if slaughtered.

Steers were slaughtered at the termination of the 1987/88 summer grazing season. Four steers graded SuperA (A3 and A4 in the 1992 carcass classification system), 60 graded A1 (A2 in the 1992 carcass classification system) and 44 graded A3 (A1 in the 1992 carcass classification system) (Table 5). The average slaughter percentage was 51.7%.

As a result of the poor grades achieved, in subsequent seasons the steers were fattened in a feedlot prior to slaughter, in order to obtain better carcass grades.

Table 5 Number of carcasses in each grade in steers subjected to target winter growth rates of 0, 0.3 and 0.6 kg/day (W0, W1 and W2) and grazing Smuts finger grass and Nile grass pastures at 6, 8 and 10 steers/ha (LSR, MSR and HSR) during the 1987/88 season

	Grade (SA, A1, A3)								
Winter treatment	W1			W1			W2		
Stocking rate	LSR	MSR	HSR	LSR	MSR	HSR	LSR	MSR	HSR
Smuts finger grass	1,2,3	0,1,5	0,1,5	0,5,1	0,3,3	0,2,4	1,4,1	0,4,2	1,2,3
Nile grass	0,3,3	0,4,2	0,5,1	0,5,1	0,4,2	0,3,3	1,5,0	0,5,1	0,2,4

Economics

Gross margins/ha (Table 6) were calculated, using prices as at 1 June 1992. The budgeted cost of maintaining Smuts finger grass and Nile grass was R525.74 and R563.17/ha, respectively (Combud, 1992). The cost of maize silage was R41.58, on an 'as fed' basis (Combud, 1992). Maize meal was bought at R495.00/ton, and poultry litter at R162.00/ton during June 1992. The purchase price of weaner steers was taken as R2.40/kg live mass (prices varied from R2.21 to R2.52/kg live mass at that time) during July 1992. Interest at 19%/annum (calculated on the purchase price of the steers) for the duration of the winter feeding period of 140 days (it was assumed that the steers were marketed on the day following termination of grazing) and 90 summer grazing days was added to the costs. Carcass price was the weighted mean price, which was calculated as the mean of the price/grade multiplied by the number of carcasses of a grade in each treatment.

The relatively poor and unexpected gross margin/ha for steers grazing Smuts finger grass at the MSR coming from the W0 treatment was ascribed to poor animal performance in that treatment.

Discussion

The DM production of Smuts finger grass (Jones & Bartholomew, 1973; Dannhauser, 1982; Brockett & Gray, 1984; Grunow *et al.*, 1984; Grunow & Rabie, 1985; Rethman, 1987; Pieterse *et al.*, 1988) and Nile grass (Jones & Bartholomew, 1973; Rhind & Goodenough, 1976; Rhind & Goodenough, 1979; Theron & Arnott, 1979; Brockett & Gray, 1984) is well documented. In these trials, the DM production of Smuts finger grass varied from 4 700 to 13 040 kg/ha. The yields for Nile grass varied from 6 190 to 13 228 kg/ha. Nitrogen applications at which these yields were measured varied from 0 to

Table 6 Gross margin/ha for Smuts finger grass and Nile grass pastures at target winter growth rates of 0, 0.3 and 0.6 kg/day (W0, W1 and W2) at 6, 8 and 10 steers/ha (LSR, MSR and HSR)

	Gross margin/ha (R)								
Winter treatment	W0			W1			W2		
Stocking rate	LSR	MSR	HSR	LSR	MSR	HSR	LSR	MSR	HSR
Smuts finger grass	303.96	139.68	441.60	287.82	332.80	508.50	216.78	365.76	357.10
Nile grass	462.06	853.60	742.70	578.10	940.64	884.00	619.44	523.04	-58.40

300 kg N/ha per annum. An assessment of the data from the trials cited indicates that, at comparable fertilizer application and rainfall levels, DM yields measured in the present study were similar to those achieved in previous trials. DM yields of 11 189 and 10 662 kg/ha for Smuts finger grass and Nile grass, respectively, were achieved on Longlands soils (Anon., 1976) in a trial where yields were measured for these pastures established on this soil type.

In a trial carried out to examine the performance of steers on *Eragrostis curvula*, animal performance was poorer during excessively wetter seasons than during dry seasons (Brockett *et al.*, 1982). This raises the question whether the poor animal performance on Eragrostis in the study by Brockett *et al.* (1982) had the same underlying cause or causes as the poor animal performance during the 1988/89 season in the present investigation. One theory propounded is that nutrients in herbage are diluted by a higher pasture growth rate and/or high rainfall.

Literature where animal performance is quantified for Smuts finger grass and Nile grass pastures in South Africa is limited. In some trials, animal performance on Smuts finger grass and/or Nile grass was reported (Rhind & Goodenough, 1979; Dannhauser, 1982; Grunow, *et al.*, 1984). The ADG achieved by steers on Smuts finger grass was 0.70 to 0.80 kg/day (Grunow *et al.*, 1984), which was higher than the ADG achieved by the steers in the present trial. In the study by Grunow *et al.* (1984), growth rates were achieved over a shorter period of time. On the other hand, live mass gain/ha on Smuts finger grass in western Transvaal was 330 kg/annum (Drewes, 1982, as quoted by Dannhauser, 1982), showing that the mass gains achieved in the present trial per area of pasture were comparable or better than those obtained in previous trials. Live mass gains of steers on Nile grass in trials by Rhind & Goodenough (1979) were similar to those observed in the present trial. Rhind & Goodenough (1979) reported that weaner steers achieved an ADG of between 0.58 and 0.62 kg/day on Nile grass, which is comparable to the ADG obtained in the present study.

Steers which grazed Nile grass performed better than those which grazed Smuts finger grass. This does not imply that Nile grass should be established in preference to Smuts finger grass. Soils that are characterized by a low moisture-holding capacity are not suitable for the establishment of Nile grass (Rhind & Goodenough, 1979). Smuts finger grass, on the other hand, grows poorly on soils that tend to become waterlogged (G.M. Brockett, pers. comm., 1991). This fact must be taken into consideration when evaluating data obtained from the present study. The pastures were established on a Longlands soil form, which has an E-horizon (MacVicar *et al.*, 1977), indicative of waterlogging.

The findings of this trial corroborate those of White *et al.* (1987) who showed that there is an inverse relationship between winter growth rate and subsequent pasture performance of steers. Because of the absence of data in the present trial concerning the amount of grass ingested, it is, however, not possible to come to any conclusion as to whether the increased summer mass gains were due to compensatory growth or to the availability of relatively more grass to the lighter steers wintered at the maintenance level than to the heavier steers wintered at 0.6 kg/day. It is noteworthy that total live mass gain (winter gain plus summer gain; TG), and thus peak live mass, was significantly higher ($P \leq 0.01$) in steers subjected to the W2 treatment compared to steers subjected to the W1 treatment as well as steers subjected to the W1 treatment compared to the W0 treatment, that is, the steers did not fully compensate or 'catch up' (Table 4).

The poor carcass grades achieved in the first year of the trial indicate that slaughtering of animals directly off pasture is precluded. Further trials at the Dundee Research Station were run to investigate the possibility of supplementary feeding on pasture to achieve the required carcass grades. Other possibilities are to market the steers to feedlotters or do on-farm feedlotting.

Milligan (1987) stated that the producer is interested in maximum profit rather than maximum production per ha. An examination of the gross margins/ha (Table 6) indicates that profits tended to be higher at higher wintering levels and at the higher SRs, until a level (stocking rate) is reached where animal performance declined, resulting in reduced profit margins. The higher gross margins at higher SRs could encourage producers to subject pastures to sustained heavy utilization, with probable adverse effects on pasture persistence and the likelihood of poor animal performance, exacerbated by a poor season, leading to sharply reduced profits.

Ideally steers should be removed from the pastures on attaining peak mass. This would allow the production of foggage, which could then be used by other livestock. Steers could be supplemented on the pasture or fed in a feedlot to achieve the required carcass grades in a relatively short period of time, allowing these animals to be slaughtered at an earlier age when meat tends to be more tender (A grade/class meat).

Conclusions

The results of this study show that higher wintering levels as well as higher stocking rates have a negative influence on performance in steers grazing Smuts finger grass and Nile grass pastures. Notwithstanding the association of higher winter growth rates with a lower live mass gain/steer on summer pasture, a higher winter growth rate resulted in a higher total live mass gain/steer at the SRs applied. Although animals did not achieve good grades off the pasture, the pastures do provide the potential to increase beef production per unit area in northern Natal.

The strategic use of energy supplementation on the pasture to improve carcass grades or finishing steers in a feedlot after the pasture phase are strategies which need further investigation.

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