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Predictability of steer performance in the feedlot

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It will be to the benefit of the feedlot industry if poor performing feeder cattle can be identified at an early stage during fattening and eliminated. This would require a close relationship between early performance and overall performance in the feedlot. The data of 280 steers in three experiments involving 19 treatments were used in analysis. Less than 40% of overall live mass gain was explained by the variation in the live mass gain in the first 5 weeks, whilst no consistent pattern in feed intake and feed conversion emerged which could be used in prediction.

Dit sal tot die voordeel van die voerkraalindustrie wees as swak presteerders op 'n vroeë stadium gedurende afronding geïdentifiseer en verwyder kan word. Vir hierdie doeleindes sou dit nodig wees dat daar 'n noue verwantskap bestaan tussen vroeë prestasie en algehele prestasie gedurende afronding. Die gegewens van 280 ossies in drie eksperimente met 19 behandelings is in die analise gebruik. Minder as 40% van die algehele lewendemassa-toename kon verklaar word deur die variasie in die lewendemassa-toename van die eerste 5 weke, en geen herhaalbare patroon is in voerinname en voeromset waargeneem wat in voorspelling benut kan word nie.

Keywords: Feedlot, performance prediction

Feedlot management would benefit if medium-term economic and marketing indicators could be interpreted together with effective prediction of biological performance. Of special significance would be if poor performing feeder cattle can be identified at an early stage during fattening and eliminated. This will be possible if the relationship between early performance and overall performance is closely correlated. A further advantage would be if the growth and feed conversion-time curves could be predicted with confidence because feedlot management can then optimize duration of feeding periods to cash in on favourable market conditions. This in turn will require particular and repeatable curves on the same diet.

These requirements were addressed with data from three feedlot experiments involving a total of 19 dietary treatments and 280 steers. The steers were adapted over 14 days and the length of the fattening period varied between 90 and 130 days. Performance results varied from excellent to relatively poor as can be seen in Table 1, whilst dietary treatments represented all types of systems currently employed in South Africa.

Intake and individual unfasted live masses were recorded every week. A third-order polynomial fitted to cumulative feed intake and live mass vs weeks was unbiased with r^2 in excess of 0,98. The differential of the resulting equations was used to calculate weekly intakes and gains in order to minimize the effects of measurement error (Meissner, 1977).

Early feedlot performance as an indicator of performance over the total feeding period was analysed as the amount of variation of the latter being explained by the former (r^2). The results are shown in Table 2.

Live mass gain during the first 3 weeks explained 16 – 36% of the variation in live mass gain over the total feeding period. This increased to 28 – 41% when the first 5 weeks were used as independent variable and no doubt would increase even further if more weeks were considered. However, it is clear that these relationships are not good enough for effective prediction. The low r^2 values for gain imply that steers which initially gain poorly may compensate later on and others which gain well initially may lose this advantage. These observations agree with those of Wagner & Gill (1983).

The correlation coefficients between intake during the first

Table 1 Summary of data used in analysis

Comparison	Treatments (n)	Steers per treatment	ADG (kg)	Daily intake (kg)	Feed conversion (kg/kg)
Experiment 1					
Complete meal feed vs whole maize with pellets	5	14 – 15	1,27 – 1,46	6,83 – 8,52	5,11 – 5,82
Experiment 2					
Whole maize vs maize meal and maize silage	4	15	1,54 – 1,68	8,00 – 8,32	4,91 – 5,40
Large vs small frame					
Experiment 3					
Whole maize/hominy chop vs maize meal/hominy chop	10	14 – 15	1,11 – 1,33	8,01 – 8,43	6,04 – 7,45

Table 2 Mean r^2 values of treatments between daily gain over the total feeding period and daily gain in the first 3 weeks, the first 5 weeks, as well as initial live mass. The range in variability of individual treatments is indicated in brackets.

Measurement	Experiment 1 (n = 72)	Experiment 2 (n = 60)	Experiment 3 (n = 148)
Daily gain (0 – 3 weeks)	0,18 (0,00 – 0,40)	0,16 (0,00 – 0,28)	0,36 (0,11 – 0,82)
Daily gain (0 – 5 weeks)	0,28 (0,01 – 0,62)	0,32 (0,04 – 0,51)	0,41 (0,13 – 0,86)
Initial live mass	0,15 (0,05 – 0,30)	0,08 (0,01 – 0,16)	0,06 (0,00 – 0,28)

3 weeks (adaptation period) and feed conversion during the total feeding period were +0,56; −0,74 and +0,62 for experiments 1, 2 and 3 respectively. High intake during this period is considered to be necessary for acceptable overall performance (Hutcheson, 1982).

Intake in the present study ranged from negatively to positively correlated with overall feed conversion. It must, however, be pointed out that because of limited degrees of freedom and across treatment analysis the results could have been slightly biased. Nevertheless, the correlations suggest that high intakes during adaptation are not necessarily a prerequisite for good performance in the feedlot. This also applies to high live mass for age, which may partially result from differences in condition, because initial live mass was not significantly correlated to live mass gain over the total feeding period (Table 2). This is in accordance with a number of studies (Crosthwait, Wyatt, Walters & Totusek, 1979; Owens & Gill, 1981).

Figure 1 illustrates patterns of feed conversion curves with time for eight of the 19 treatments chosen at random. Feedlot feeders usually assume that feed conversion increases progressively with time. These results, however, show that there is no classical or general pattern but that each treatment may exert its own pattern. This was indeed confirmed in Experiment 2 as illustrated in Figure 2, where a test with two frame types suggests that the influence of a particular diet may be more pronounced than differences between frame types, and bearing in mind the results in Table 2, also differences in steer condition or initial live mass.

Consequently, there is evidence to believe that repeatable results per diet for groups or pens of steers are possible but this needs confirmation. In contrast, individual performance as shown in Table 2 is not predictable.

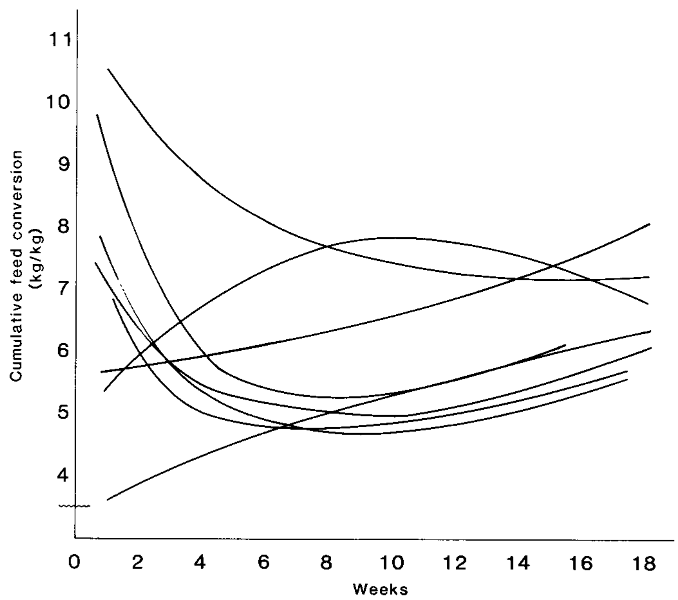

Figure 1 Variations in patterns of feed conversion curves with time for feedlot steers with different frame size and fed different diets

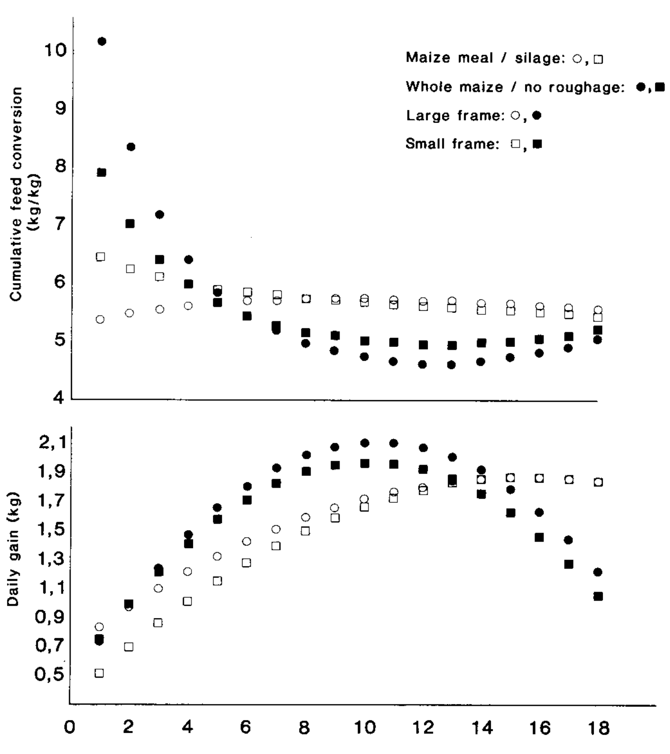

Figure 2 Influence of diet and frame size on feed conversion and average daily gain in feedlot steers

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