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FEED INTAKE AND GROWTH IN NEW ZEALAND FEEDLOTS

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SUMMARY

Animal performance, feed intake and feed quality data are reviewed from five commercial and four research sources giving twenty-two situations of beef feedlotting in New Zealand. Mean liveweights of beasts ranged from 125 kg to 455 kg with average daily liveweight gains varying up to 1.5 kg/head. The highest growth rates were recorded on commercial feedlots. Average daily intakes (kg dry matter as a percentage of liveweight) ranged from 1.6% to 2.8% and ration concentration from 8.2 to 12.6 MJ ME/kg DM.

In general, higher growth rates were recorded where daily intake and ration concentrations were high, and this was associated with higher portions of grain in the diet.

The measured intakes were compared with ARC feed tables and reasonable agreement was observed.

INTRODUCTION

The generally accepted view of feedlotting is that of beasts on a high grain diet being finished and slaughtered for a specialist market. For the purposes of this review the concept of feedlotting has been broadened to include any situation where beasts are confined and their feed carted to them. The writers believe that there are situations where feedlots may be used for purposes other than finishing.

This paper reviews data available from private feedlot operators and some nutrition research trials in New Zealand.

SOURCE OF DATA

The information collected from each feedlot related to number in group; breed and sex; period of feeding; initial and final liveweights; quantity of feed, and quality of feed. Five commercial lot operators supplied adequate data. There were eight other private feedlots situations of which we were aware, some of which had been widely publicized. Data from these have not been included in this review as adequate or reliable information could not be supplied. It is surprising that data had not been collected as these feedlots were operated either for profit or to examine the potential profitability of a large-scale feedlot business. In our view, the data sought were all highly relevant to profitability, yet some operators appeared reluctant to spend time collecting factual information. One situation reported growth rates of over 1.8 kg/head/day. These liveweights were obtained by eye appraisal and no weighing scales were used.

In several other situations only half the feed intakes were known. The quantity of grain or concentrate was measured but no reliable record was kept of straw, hay or silage that was fed with it. The five operators who supplied data made measurements on a total of twelve different feeds or classes of livestock.

Research data were collected from ten situations operating in conditions similar to the commercial operators.

RESULTS

Cattle and Feed

The private operators used traditional British beef breeds, predominantly steers. Each group had between 16 and 100 cattle fed for 70 to 114 days. The mean liveweights ranged from 200 kg (weaners being wintered) to 450 kg (finishers).

Research trials selected for this review used predominantly Friesian beef cross animals. Group size ranged from 6 to 60 animals, and cattle were fed for periods from 49 to 90 days.

Feeds used by commercial operators have been generally classified as:

(1) Hay and/or grain—unprocessed, although the grain was rolled or milled;

(2) Pellets or nuts—processed from grain, hays and straws;

(3) Maize silage, with or without other feeds.

Research workers used only hays and grain, or maize silage, in feedlot situations.

Feedlot Performance

Four important parameters of feedlot beef production are liveweight, growth rate, feed intake and feed quality. These are presented in Tables 1 and 2 for all commercial and research data, respectively, included in this review.

The mean liveweights were derived by averaging the initial and final liveweights. Daily liveweight gain (DLWG) was averaged for the period in the feedlot. In most situations the

TABLE 1: DETAILS OF FEEDLOT SITUATIONS RECORDED BY FIVE COMMERCIAL OPERATORS

Feedlot	No. Animals	Days on Feedlot	Mean Liveweight (kg)	Av. Liveweight Gain (kg/day)	Type	Ration Composition (% DM)	Concentration (MJ ME/kg DM)	Measured Intake ((kg DM/kg LW)%)	Measured Intake (MJ ME/day)
(1)	90	114	235	1.09		37.5 Straw	10.2	2.6	63
					Nuts	37.5 Lucerne			
	79	96	230	1.05		25.0 Grain	10.2	2.6	62
						40 Straw			
	20	70	455	1.50	Nuts	30 Lucerne	10.9	2.8	139
						30 Grain			
						66 Grain			
(2)	16	112	412	1.2	Nuts	20 Straw	11.3	2.1	98
						14 Lucerne			
						55 Grain			
	16	112	407	1.1	Nuts	30 Straw	10.7	2.2	95
						15 Lucerne			
	16	112	423	1.4	Nuts 72	88 Grain	11.7	2.2	106
						12 Lucerne			
					Hay	28			
(3)	10	91	417	1.35	Barley	90	12.6	2.4	126
					Straw	10			
(4)	25	90	228	0.37	Hay	100	8.4	1.8	36
	25	90	235	0.55	Grain	20	9.2	2.2	47
					Hay	80			
	25	90	239	0.58	Grain	32	10.2	2.3	54
					Hay	68			
	100	95	425	0.50	Grain	30	9.7	1.6	65
					Hay	70			
(5)	100	90	353	1.05	Maize silage	65	12.2	2.8	101
					Maize meal	35			

TABLE 2: DETAILS OF SOME FEEDLOT SITUATIONS RECORDED BY RESEARCH WORKERS

Ref.	*No. Animals*	*Days on Feedlot*	*Mean Liveweight (kg)*	*Av. Liveweight Gain (kg/day)*	*Type*	*Ration Composition (% DM)*	*Ration Energy (MJ ME/ kg DM)*	*Measured Intake ((kg DM/ kg LW) %)*	*Measured Intake (MJ ME/ day)*
Barton, pers. comm.	60	60	400	0.82	Maize silage	43	9.0	2.4	86
					Hay	57			
Reardon, pers. comm.	16	92	127	0.25	Maize silage	100	10.0	2.4	30
Reardon, pers. comm.	10	77	304	1.03	Maize silage	76	9.7	2.5	73
					Pasture	24			
Nicol, pers. comm.	10	67	220	0.00	Straw	72	7.8	2.1	36
					Barley	17			
					Lucerne	11			
	10	67	227	0.30	Straw	60	8.6	2.6	46
					Barley	25			
					Lucerne	15			
Monteath, pers. comm.	10	85	410	0.8	Hay	55	10.5	2.1	76
					Barley	45			
Barton, 1973	60	70	215	0.43	Hay	89	8.9	2.5	49
					Barley	11			
Reardon,	6	49	387	0.22	Hay	100	8.5	2.2	55
pers. comm.	6	49	430	0.48	Hay	64	9.7	1.9	79
					Maize	36			
	16	92	125	0.22	Hay	100	8.3	2.2	23

beasts were given an introduction to the feed. This preconditioning period differed between operators and was excluded when calculating liveweight or liveweight gains.

Intake data were supplied by all operators and researchers in terms of average dry matter (DM) intake per beast except for two commercial operators where only daily wet matter intakes were known. All intakes were converted to metabolizable energy (ME) intake expressed in megajoules (MJ) by using standard conversions (ARC 1965). Where *in vitro* digestibilities were known, the conversion factor used was:

1 kg DOM = 16.7 MJ ME (Joyce, 1971)

Where *in vivo* digestibilities were known for the feeds, the conversion factor was:

1 kg DDM = 15.7 MJ ME (Reardon, pers. comm.)

A ration concentration in MJ ME/kg DM was calculated for each feed situation.

DISCUSSION

Commercial operators and researchers used a similar range of cattle liveweights, yet the higher growth rates were obtained by the commercial operators. The agricultural press and hearsay have reported DLWGs of 1.8 to 2.0 kg/head/day being achieved in feedlots in New Zealand. However, the data presented in this paper do not substantiate these claims. The

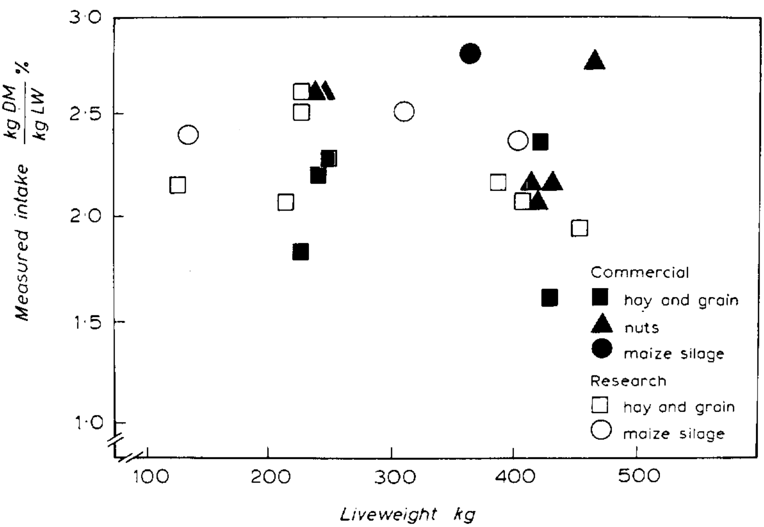

FIG. 1: *Measured feed intake according to liveweight on commercial and research feedlots.*

growth rate of a beast depends on both the quality of feed eaten and the quantity of that feed. Daily dry matter intakes have been expressed as a percentage of liveweight, and are compared with liveweight in Fig. 1.

The considerable variation in intakes probably has two main causes. First, intake measured by operators was really a measure of feed offered. Thus the intake data include a quantity of feed not actually ingested, *i.e.,* wastage. This was probably the main reason for the apparently very high intakes (2.8% of liveweight for a 450 kg beast = 12.6 kg DM/head/day). From a practical point of view, these intakes may be necessary to achieve high DLWGs in feedlots. The second factor was possibly a bulk factor associated with feeding hay or silage. Although operators generally attempted to feed *ad libitum* to maximize intakes, some factor associated with hay and grain feeding limited high intakes.

While the higher liveweight gains tended to be associated

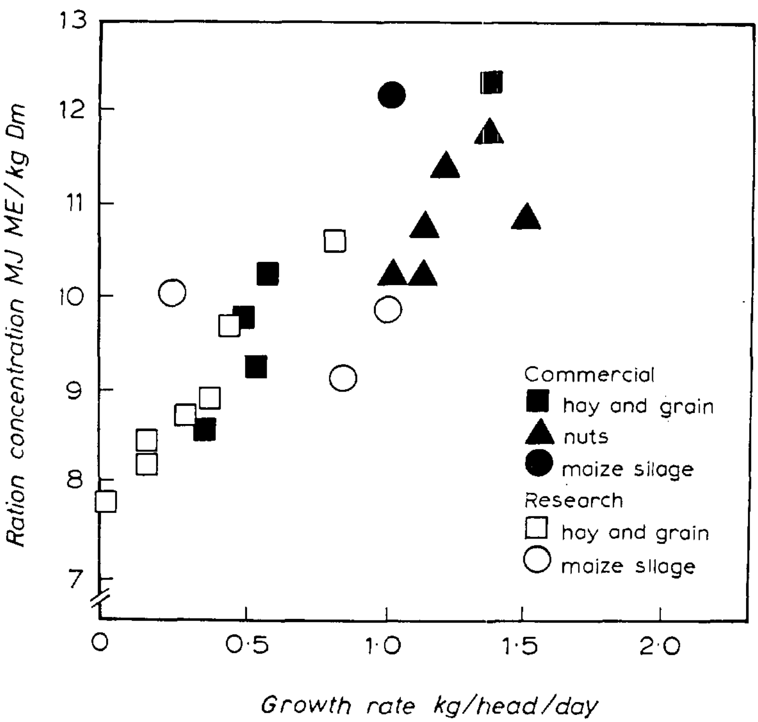

FIG. 2: *Ration energy concentration and liveweight gain of beasts on commercial and research feedlots.*

with higher intakes, a much clearer and positive relationship existed between ration concentration and DLWG (Fig. 2).

It is clear that the higher DLWGs were associated with high ration ME concentrations. Within two of the types of feeds the higher ration concentration was associated with a higher portion of grain. Reference to Table 1 shows that the ration energy concentration increased from 8.4 to 12.6 MJ ME/kg DM as the grain portion increased from zero to 90%. Similarly, where nuts were used the ration concentration increased from 10.2 to 11.7 MJ ME/kg DM as the grain percentage increased from 37.5 to 88. A similar trend can be observed in the research results by referring to Table 2.

Some of these research results were taken from nutritional studies. However, it is surprising that 45% grain was the highest portion of grain included in the diet by any research worker. With dependence of high DLWGs on ration concentration, obviously high portions of grain must be fed.

Research workers have not, as yet, worked with processed feeds. The pelleted feeds have consistently given high growth rates. Pelleting is an easy way of mixing feeds especially straws and hay to give a readily accepted ration. Whenever nuts were fed on a feedlot, high growth rates were obtained.

It is possible that researchers found difficulty in feeding high energy rations; yet they may have deliberately avoided them for some reason. This raises the questions of whether commercial operators and researchers feedlot cattle for different reasons. Therefore, when considering the data reviewed it is important to differentiate between sources of data. Any management factor that limits intake will reduce liveweight gains. Mud was a common factor in many feedlots, even in dry climates. Various operators have overcome, or attempted to overcome this in different ways. The most common way was to concrete the feeding area and develop a special loafing area. Mud and the accumulation of dung are problems that commercial feedlot operators will have to surmount before extensive feedlotting can be contemplated.

When nuts were fed, animals showed a craving for long feeds, and would eat any straw or hay they could. In some cases they were observed eating soil and sawdust. This desire for other feeds obviously did not limit their high growth rates.

In discussing feeds, the question of additives has been deliberately excluded. Each operator had a particular policy and in some cases the nature of additives was considered confidential. Most operators had a crude protein level above 10%, and many aimed at 13%; in some situations urea was added to obtain this level. There was no consistent pattern in the use of additives.

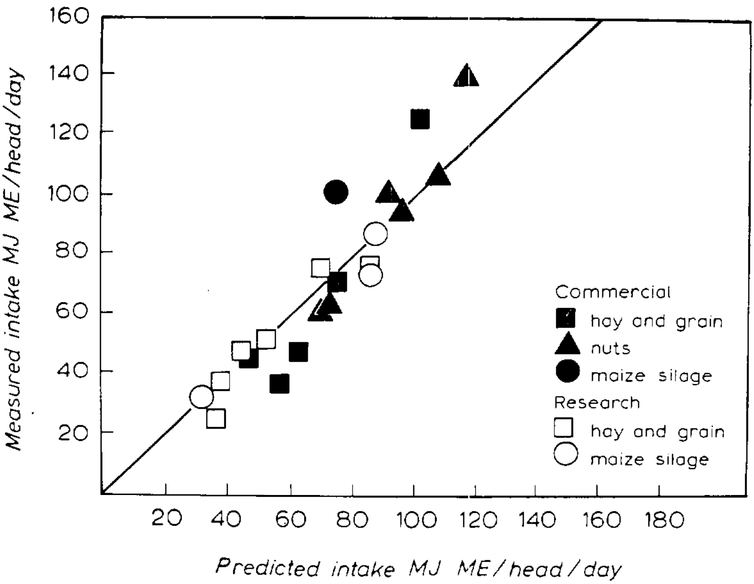

FIG. 3: *Relationship between measured and predicted energy intake on commercial and research feedlots.*

When considering and planning feedlotting, entrepreneurs must have some knowledge of the likely performance of cattle when fed any given quantity or quality of feed. Various tables of cattle feed requirements have been calculated by animal nutritionists. If these tables are to be of value to entrepreneurs, they must accurately predict the real situation. ARC (1965) tables have been used to predict the feed requirement for each situation, taking into consideration liveweight, liveweight gain, and ration energy concentration. These predicted intakes have been compared with the measured intakes for each situation and are shown in Fig. 3.

If there was complete agreement between the predicted and actual situations then all points would lie on a straight line at 45° to the axis. The data presented in this paper suggest that there was good agreement between the theoretical feed inputs and the resulting animal performance and that obtained under feedlot conditions.

CONCLUSIONS

In reviewing feeding and growth on some New Zealand feedlots, there is limited source of factual data from commercial situations. By combining selected research results sufficient data were obtained to highlight trends. It has been shown that moderately high growth rates have been obtained on feedlots. These were associated with high grain feeding and high intakes. Commercial operators have obtained higher performance than research workers. For predicting animal performance the ARC beef feed requirement tables would appear to give reasonable accuracy.

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