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WHEAT GRAIN AND WHEAT STUBBLE FOR INTENSIVE FATTENING OF YEARLING STEERS

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Summary

Fifty-four me-year-old steers in store condition were grazed on wheat stubble at three rates of stocking. Whole wheat grain was fed at three levels at each stocking rate for a feeding period of 13 weeks. Stocking rate had no influence on liveweight gain at any level of grain feeding. Average rates of liveweight gain were 0.02, 0.30 and 0.47 kg/day when the animals were fed an average of 2.3, 3.4 and 4.5 kg grain/day respectively. Reasons for low rates of liveweight gain are advanced.

I. INTRODUCTION

Recent imposition of wheat quotas has forced many farmers to use alternative enterprises to maintain net farm income. Many are sowing down annual pastures and fattening store cattle on land released from wheat growing. An alternative however, may be to continue sowing wheat and to graze young steers on the stubble, while feeding back the grain at a high level.

Morris, Pepper and Gartner (1969) found that wheat, barley and sorghum fed at a high level were of comparable value as fattening rations in a feedlot, but that sorghum appeared a "safe" grain due to less digestive trouble. Rabbitte (1970) claimed that the intensive fattening of yearling steers in a feedlot, using grain and pasture hay, can be a profitable enterprise. Compared with this method, the fattening of steers on standing stubble and grain would involve lower labour costs and no capital outlay for yards.

The experiment reported here was done to determine whether 12 month old steers could be suitably fattened on a ration of wheat grain when they had free access to varying amounts of standing wheat stubble.

II. MATERIALS AND METHODS

(a) *Design*

A 3 x 3 factorial allocation of treatments was used to investigate three rates of grain feeding at each of three stocking rates on wheat stubble (Table 1). Plot sizes, and thus stocking rates, were chosen so that at the intermediate plot size (1.39 ha) and feeding rate, the total quantity of wheat consumed by six steers would approximate that which would be harvested on the plot in an average year (1.61 Mg/ha).

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(b) *Animals*

Fifty-four one year old steers of beef and dairy-beef origin and in store condition were drenched with Nilverm(R)*, sprayed twice with Diazinon(R) and vaccinated twice with C.S.L.(R) 5 : 1 Clostridial vaccine before entering the experiment. They were weighed full and fasted? and then allocated randomly, six to each of nine treatments in January 197 1.

(c) Feed and feeding schedule

Before being fed, 1 per cent super fine limestone was mixed with the whole wheat (cv. Olympic). All animals were fed at the rate of 0.9 kg/head/day for the first 2 days, and this was increased by 0.5 kg/head every second day until the required feeding levels of 2.8, 4.4 and 6.1 kg/head/day were reached at 10, 16 and 24 days respectively. As steers on the highest rate of feeding would not consistently consume more than 5.4 kg/head/day, the feeding levels were reduced to 2.7, 4.1, and 5.4 kg/head/day respectively for most of the experiment. The average daily rates of feeding for the whole 91 days of the experiment were 2.3, 3.4 and 4.5 kg/head.

(d) *Measurements*

Animals were weighed full fortnightly, and full and fasted at the end of the feeding period.

Availability of stubble was measured before the feeding period started by cutting 50 quadrats (0.2 m^2) to ground level at random over the experimental area, and at the end of the feeding period by cutting 20 quadrats to ground level in each plot. These measurements were used to calculate the apparent intake of stubble (kg/steer/day) for each treatment during the experiment. Losses of stubble due to weathering and trampling were not measured, although the seasonal conditions suggested these would have been small.

A proximate analysis (including a Kjeldahl method for nitrogen) was done on a composite of daily grain samples and on stubble samples collected 6 weeks after the experiment started.

Changes in liveweight were examined by analysis of variance.

III. RESULTS

At the start of the experiment, the mean starved liveweight of each of the nine groups of steers was 208.4 ± 10.4 (S.D.) kg.

Changes in fasted liveweight for all treatments are shown in Table 1. Differences in liveweight gain were significant ($P < 0.01$) between feeding rates, but not between stocking rates. There was no interaction between feeding rate and stocking rate.

A small percentage of the standing feed available was made up of dry annual grasses, but there was no pasture growth during the experiment. The mean initial availability of stubble for all plots was 4600 kg/ha. Apparent intake of stubble

*(R) = Registered trade mark; †24 h without food or water.

(Table 2) decreased with increase in both stocking rate and level of grain feeding. Thus the proportion of grain in the ration increased with increase in both stocking rate and rate of grain feeding.

Average rates of liveweight gain were 0.02, 0.30 and 0.47 kg/day and the efficiency of total feed conversion 320.0, 22.7 and 15.8 kg feed dry matter/kg liveweight gain when the animals were fed 2.3, 3.4 and 4.5 kg grain/day respectively.

TABLE 1

Effect of rate of grain feeding and stocking rate on change in liveweight of steers

Stocking rate (steers/ha)	Grain feeding rate (kg/day)			Mean*
	2.3	3.4	4.5	
	Change in liveweight (kg/steer)			
8.65	−1.8	31.3	51.8	27.1
4.32	7.3	26.8	38.1	24.1
2.87	−0.9	24.5	37.2	20.3
Mean	1.5	27.5	42.4	

*L.S.D. (P = 0.05) for row and column means = 9.1, L.S.D. (P = 0.01) for row and column means = 11.8.

TABLE 2

Apparent intake** of **wheat stubble by steers

Stocking rate (steers/ha)	Apparent intake of stubble (kg/steer/day)			Mean
	Grain feeding rate (kg/day)			
	2.3	3.4	4.5	
8.65	3.3	2.7	2.1	2.7
4.32	5.6	4.1	4.2	4.6
2.87	5.8	5.8	4.9	5.5
Mean	4.9	4.2	3.7	

On a visual assessment and liveweight basis, the animals were not considered suitable for slaughter at the end of the feeding period.

Most of the animals at the two highest rates of feeding exhibited digestive disturbances 2 weeks after the feeding period began, and as a consequence, negligible weight gains were recorded until grain rations were stabilized on these treatments. Grain feeding was discontinued on all treatments for 2 days, then a small amount of molasses was added to the ration on all treatments for a week to encourage steers to eat the grain. No further digestive disturbances were observed, but steers fed the highest rate of grain exhibited lethargy and lack of appetite at times. Although four steers exhibited lameness, veterinary advice

showed that this was associated in two cases with ephemeral fever and in two cases with constipation.

The crude protein contents of the wheat grain and wheat stubble were 12.1 per cent and 2.9 per cent of the dry matter and moisture contents were 11.6 per cent and 9.1 per cent respectively.

Average maximum and minimum temperatures were 29°C and 15°C respectively during the first week of the experiment and 19°C and 9°C respectively during the last week of the experiment. On only 10 days did the temperature rise above 32°C and the highest temperature recorded was 34°C.

IV. DISCUSSION

Rate of liveweight gain and efficiency of total food conversion were both positively related to the proportion of grain in the diet. These results are consistent with those of Morris (1966) using grain sorghum and sorghum silage.

Low weight gain of the steers at the highest rate of grain feeding was due to the low conversion rate of 15.8 kg feed dry matter/kg liveweight gain. The feed was estimated to contain 59 per cent T.D.N. (Hewitt, 1966) including 7.1 per cent crude protein, in comparison to the National Research Council (1970) recommendation for this weight of steers of 11.1 per cent crude protein in T.D.N. of *72* per cent. The low conversion rate was therefore due, at least partly, to the low nutrient content of the diet, which would have been improved if the steers had eaten the quantity of grain expected of them. The quantity of grain consumed may have been limited by the low protein content of the diet.

With regard to both consumption and conversion efficiency, Morris, Pepper and Gartner (1969) obtained a feed conversion figure of 6.5 kg feed dry matter/kg liveweight gain for steers fed cracked wheat ***ad lib.*** and oaten chaff, which provided 12.0 per cent crude protein in the feed eaten.

Morris, Gartner and Pepper (1967) found a slight increase in liveweight gain of steers when urea was added to high grain rations of 12 per cent crude protein content. Urea is the cheapest source of additional nitrogen and if given, would probably have increased the efficiency with which the energy of our ration was utilized.

Increasing the availability of stubble resulted in an apparent increase in consumption of stubble, although this did not result in any increased performance of the steers, and in fact appeared to depress performance slightly. Thus it appears that, at least while nitrogen is limiting, increasing the quantity of stubble available has no beneficial effect on the rate of liveweight gain.

At the highest rate of grain feeding, temperature did not appear to be the cause of steers exhibiting lethargy and lack of appetite. Morrison (1961) also reported cases of "feed-tiredness" in cattle fed high levels of wheat.

The digestive disturbances and lack of weight gains early in the experiment were probablv caused by grain being introduced too rapidly to the animals. Morris, Pepper and Gartner (1969) used the same rate of introduction of grain as reported here, but with oaten chaff, and did not report digestive disturbances at this early

stage. In our experiment, low palatability and poor quality of the wheat stubble probably led to grain forming a high proportion of the diet during the introductory period, which in turn could have led to digestive troubles. Thus a slow rate of introduction of grain appears essential if high grain rations and roughages of low quality and palatability are to be used. In fact, provision of higher quality roughages may be necessary during the period of introduction of the grain.

The experiment has shown that it is unlikely that 12 month old steers can be fattened on a ration comprising only wheat grain and wheat stubble.

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