BEEF PRODUCTION: POTENTIAL AND OUTPUT IN MID-CANTERBURY

S. D. WALKER

Field Officer, N.Z. Sheep and Beef Cattle Survey, Lincoln College

W. R. LOBB

Superintendent, Winchmore Irrigation Research Station, Ashburton

INTRODUCTION

CLIMATE and pasture production in mid-Canterbury have been discussed by Rickard (1968). Under "dryland" farming conditions, pasture production is limited by (1) winters of some 110 to 130 days when production is very low and (2) dry periods of variable incidence and duration during the remainder of the year. These latter not only restrict output every year but also result in a large "between years" variation in annual pasture production. However, adequate irrigation eliminates the dry periods and results in pasture production characterized by :

(1) A higher annual production of some 9,000 to 10,000 lb D.M. per acre.

(2) A very low variability between years.

(3) Well-spread production within the growing season.

(4) Approximately half of total growth occurring after January 1.

For the livestock farmer, the implications of these changes are very great.

The pattern of irrigated pasture production was shown to coincide more closely with the feed requirements of a beef-breeding herd than with those of a prime-lamb ewe flock. However, as more calves become available from increased cow herds in the foothills and high country, and these are augmented by calves bred on dairy farms, it seems probable that beef production on the easier country will become concentrated on finishing, rather than on breeding. This paper outlines experimental work into finishing beef cattle at Winchmore Irrigation Research Station and considers the potential for beef production in mid-Canterbury in the light of the results obtained.

EXPERIMENTAL

MEAT PRODUCTION TRIAL

Over four seasons from 1957-8, a meat production trial at Winchmore Irrigation Research Station compared output from three self-contained farmlets. One of these carried a breeding flock and produced lamb only; the second produced chiller beef from weaner calves purchased in the autumn and sold before their second winter; while the third unit was stocked with both ewes and cattle and approximately half its production was lamb and the rest beef.

All forty acres of each farmlet were in pasture and the stock were wintered on autumn-saved pasture and meadow hay. Stocking rates were 7 to 7.5 ewes/acre, 1.1 to 1.2 weaner steers/acre and 3.5 to 4 ewes plus 0.5 steers/acre on the respective treatments. A summary of four years' production is given in Table 1.

TABLE 1: MEAN MEAT PRODUCTION (lb per acre)

Treatment	*Lamb*	*Beef**	*Total*
Sheep only	 240	—	240
Cattle only	.... —	275	275
Sheep and cattle	 150	150	300

*Beef production is net, estimated carcass weights of calves at purchase having been subtracted.

The results suggest that systems of meat production which include beef are likely to produce more, rather than less, meat per acre, with maximum output when both lamb and beef are produced.

Other features shown by the trial were:

(1) During spring and summer, the "beef only" farmlet was seriously understocked but it was difficult to provide sufficient feed of adequate quality for wintering. Excess hay was made in each season.

(2) This understocking led to deterioration of the swards. Cocksfoot increased in dominance; as time passed it became rank and tufty and suppressed clover growth to a marked extent. Observations suggested that this deterioration adversely affected the performance of the cattle.

(3) The differing times of peak demand of the ewe flock and of the cattle dovetailed excellently. For example, during lambing the ewes could be given preference

and the cattle restricted if necessary; and in late summer the dry ewes required less feed, leaving greater scope for the cattle.

(4) Under the conditions of this trial, sheep were necessary to control pastures for cattle; but cattle were not needed for this purpose on the sheep only unit.

(5) Meadow hay and autumn-saved pasture, of a quality and quantity suitable for wintering ewes, was not always adequate to winter all the weaner calves.

(6) Failure of weaners to progress satisfactorily during the winter was the major stock problem. This is illustrated in Table 2.

TABLE 2: DAILY LIVEWEIGHT GAIN (lb per head)

Season	*1958–9*	*1959–60*	*1960–1*
Winter	0.3	1.1	0.5
Summer	1.9	1.6	1.5

Many of the weaners showed no obvious disease symptoms other than failure to make adequate gains, but in most seasons some 10 to 20% appeared unthrifty with profuse scouring and harsh, ragged coats. Parasitism seemed a possible cause. Lice were found to be present and were controlled by standard treatment. But this did not correct the problem; nor did the administration of copper, selenium or the anthelmintics then available.

WINTERING TRIALS

In an attempt to improve winter feeding, paddock trials were started incorporating swedes and lucerne hay. Four seasons' results are averaged in Table 3.

TABLE 3: WINTER FEEDS: MEAN LIVEWEIGHT GAIN

	lb/day	*S.E. of Treatment Means*
Autumn-saved pasture	1.2	0.08
Swedes	1.4	0.09
Meadow hay	1.2	0.08
Lucerne hay	1.45	0.10

Swedes appeared to be a little better than autumn-saved pasture but, with crops of 30 to 35 tons (8,500 to 9,500 lb D.M.) per acre, the likely improvement was not considered sufficient to compensate for the additional costs and the loss of grazing involved. Moreover, for some unknown reason, pastures established after swedes were slow to attain full production.

Lucerne hay appeared to be slightly superior to meadow hay, but this has not been followed up. Lucerne for grazing as well as hay could have possibilities, provided bloat is not a problem. Suitable cereal and/or grass drilled into the stand could well improve winter feeding.

Observations suggested that the young steers were seriously affected by the low temperature and/or cold winds experienced. As a consequence, some small indoor feeding trials were carried out. One compared indoor feeding on good to average meadow hay fed *ad lib.* with and without limited amounts of concentrates. The concentrates used were a 10:1 mixture of milled barley and linseed-based nuts fed at 1 lb/100 lb liveweight/day. There were eight animals in each treatment and the results are summarized in Table 4.

TABLE 4: INDOOR FEEDING: DAILY LIVEWEIGHT GAIN
(lb per head)

	Winter	*Summer*	*Annual*
Hay	1.2	1.9	1.7
Hay + Concentrates	1.8	1.5	1.7

The data suggest that wintering in an open-fronted barn on good meadow hay could be satisfactory, economical, and require relatively little labour.

Treatments of a second trial are set out in Table 5. Results are given in Table 6.

TABLE 5: WINTER FEEDS AND SHELTER—TREATMENTS

Treatment	*Feeds*	*Shelter*
1	Swedes plus hay	Paddock
2	Hay and limited concentrates*	Pen well sheltered by hedges allowing 0.1 acre/beast.
3	As for Treatment 2	As for Treatment 2 but with access to open-fronted shed.

* Concentrates similar in composition and amounts to those in previous trial.

TABLE 6: FEEDS AND SHELTER: MEAN LIVEWEIGHT GAIN (lb)

Treatment	*Winter*	*Summer*	*Total*
1	89	342	431
2	183	246	429
3	185	236	421

This trial, like that outlined immediately above, shows a strong "compensatory" growth effect. It also demonstrates that wintering in a well-sheltered pen is quite satisfactory without additional shelter. Under such conditions, feeding of limited amounts of concentrates could be economical and allow sufficient weaners to be wintered to permit higher summer stocking. It seems possible that the amounts of concentrates might be further reduced.

SUMMER STOCKING TRIALS

In the meat production trial, a stocking rate of 1.1 to 1.2 beasts per acre was too low on the all-beef unit. In recent years a series of summer stocking trials has been started to determine the optimum rate. In the first of these, stocking rates of 1.5 and 2.1 beasts per acre were compared. On each treatment the animals rotationally grazed three paddocks. Results are given in Table 7.

TABLE 7: SUMMER STOCKING 1966-67: LIVEWEIGHT GAIN (lb)

Beasts/Acre	*Head/Day*	*Head/Period*	*Acre/Period**
1.5	1.75	296	445
2.1	1.6	271	570

* 167 days: from September 28, 1966 to March 15, 1967, when the first draft was taken. As the final draft was not taken until June 8, 1967, total gain per acre for the season would exceed the figures given.

The data show a negligible difference in gain per animal but a marked increase in gain per acre with the increased stocking rate.

In the following season a second trial was conducted by J. F. Rudman (pers. comm.), using stocking rates of 2.0 and 2.5 beasts per acre. In this trial, the cattle rotationally grazed nine paddocks on each treatment. Table 8 shows the results.

Data from these two trials indicate that summer stocking in excess of those in the early trial are possible with only slightly depressed liveweight gains per animal and considerably increased output per acre.

TABLE 8: SUMMER STOCKING 1967-68: LIVEWEIGHT GAIN (lb)

Beasts/Acre	*Head/Day*	*Head/Period**	*Acre/Period**
2.0	1.60	268	536
2.5	1.55	259	648

* 169 days: October 17, 1967 to April 13, 1968.

OUTPUT AND POTENTIAL

The trials reviewed have shown that a high level of beef production is possible on irrigated pasture in mid-Canterbury. The problems of wintering sufficient weaners have not been solved in full; but the trials have suggested several possible alternatives that should not be too expensive. Which of these is adopted will depend on the stocking rate, the pattern of farm management, and the personal preferences of the farmer. They have shown, too, that summer stocking can be at a much higher rate than those commonly employed. The optimum rate has not yet been determined but Fig. 1 shows means monthly pasture production and feed requirements at a stocking rate per acre of two weaner steers purchased in late March and finished before their second winter. Feed requirements per animal were calculated from the tables of Coop (1965) and Morrison (1961); monthly numbers were estimated from times of disposal on the Winchmore trials.

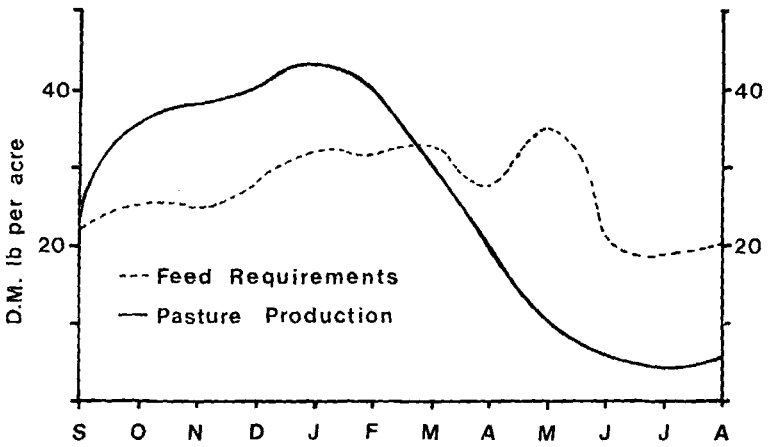

FIG 1: *Pasture production and feed requirements for two beasts per acre (lb D.M. per day).*

From the graph it would seem that two beasts per acre is near attainment if all techniques are exploited to the full. On the animal side this means buying well-grown heavy weaners and drafting regularly as the cattle reach slaughter weight. Great care should also be taken to see that animals showing signs of "lumpiness," which indicates excess fat, are sold immediately. Adding weight to these animals uses much feed and results only in an undesirable carcass. Wintering should aim at good but not excessive gains; and the provision of shelter is most essential. In addition to good paddock shelter, some additional provision for winter, in the form of either pens or sheds, would be desirable. Even if a more conservative stocking rate of 1.75 beasts per acre were assumed, this type of management would produce upwards of 400 lb net beef per acre.

But what of the future? Using cattle, whether of the traditional breeds or of dairy origin, with greater potential for liveweight gains, it will be possible to draft earlier and at lighter weights, if necessary. This will reduce the pressure on autumn feed supplies and allow a better start for the weaners and greater provision of autumn-saved pasture for winter. This will permit high stocking rates and an even higher potential output. Nor must the influence of the modern demand for a lean carcass be forgotten. Results to date have been achieved while producing animals of "chiller" type, with a good "fat cover". The nutrients used in the production of this fat would have produced a much greater quantity of lean meat. Considering all these factors, it seems that there is potential for an output well beyond the 400 lb postulated above. That this is not too impractical is shown by the fact that one farmer in the area is already producing over 500 lb beef per acre (Reeves, 1967).

Thus it seems that the district is very well placed to take advantage of the current market for beef; but it must not be forgotten that the meat production trial reviewed showed that total meat output was greatest when both lamb and beef were produced. Shortage of weaner calves alone will ensure that this is the pattern on most farms, at least in the near future. When this shortage is made good, the degree of emphasis placed on cattle compared with sheep on any individual farm will depend largely on the relative profitability of selling lamb plus wool, compared with beef only. The summation of these individual decisions will determine how far the current swing to beef in the area will continue.

Indications are that, while production per acre is at a fairly low level, beef alone will be less profitable than sheep only. Indeed, if figures from the meat production trial are taken, it was only in the 1967-8 season that gross margin from beef exceeded that from sheep. The prices of weaners in autumn 1968 suggest that this may not hold for the coming season. But when beef production is at a high level, estimates suggest that its profitability relative to lamb plus wool is much improved. This paper has shown that pasture production on irrigated areas of mid-Canterbury is very well suited to just such levels of output. Moreover, the findings reviewed will be applicable to a degree to the easier foothills, downlands and western plains of mid- and South Canterbury, wherever rainfall is adequate for good summer pasture production. When all these areas and the high levels of output possible are considered, it will be seen that the potential for beef production in this part of New Zealand is very great. The techniques to obtain this increase are known; how far the potential will be realized will depend largely on how rewarding it will be; that is, on its profitability to the individual farmer.

REFERENCES

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DISCUSSION

To a question regarding the accuracy of the data on stock requirements, Walker replied that they were the best available and the technique did give a standard for comparison. The problem of relating pasture measurements to animal requirements was very great.

A lax rotational grazing system was employed. The meat production figures given were based on freezing works' data.

In reply to a query concerning the use of modern anthelmintic drugs, Walker replied that the trials were carried out before the newer drugs were released.

Criticism was made of the general relative stocking rate at Winchmore compared with farms in the area and the opinion was expressed that Rickard's data in an earlier paper indicated that trials at much higher stocking rates should be carried out. Walker considered that perhaps the use of hay would help to achieve higher production. Lobb agreed that they were concerned at the apparent deficiency in utilization of pasture. It was intended to follow up with further work on pasture utilization using higher stocking rates. At the same time, the economic aspects would have to be taken into account.