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BEEFIN: Maximizing profits from feeding beef cattle out of season

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BEEFIN is a computer model that formulates profit maximizing diets for finishing beef cattle to a specified carcass weight and fat thickness. It predicts cattle growth rate, feed conversion ratio, final liveweight, number of days on feed and the amount of the available feedstuffs required to finish cattle to specification. The diets fulfil the animal's energy, protein, mineral and roughage requirements.

BEEFIN also calculates a profit and loss budget for the enterprise, performs a sensitivity analysis on changes in the prices for both cattle and feed and determines the changes in feed prices needed before the composition of the diet is altered.

During summer and autumn, pastures in Western Australia’s south-west agricultural area are usually of low nutritive value and it is impossible to finish cattle on them without supplementary feeding. Finished cattle at this time command premium prices. Feeding cattle supplements is an option that allows producers to take advantage of high out-of-season prices, but careful planning, good management and marketing skills are needed to ensure the feeding enterprise is profitable. Margins also become tight as grain prices increase.

Producers considering feeding cattle out of season can use BEEFIN to evaluate their alternative choices for feeding cattle. This free service is available through any Department of Agriculture office in the south-west.

Inputs
Buying options

There are three sources of cattle for feeding. Producers should consider all sources because the one first chosen may not turn out to be the most profitable. In calculating the initial cost of cattle, BEEFIN includes the capital invested in livestock. It also considers the estimated dates of buying, start of feeding and selling of the cattle.

The first option is to retain unfinished weaners. The model calculates the potential value of these animals by estimating their current market value and deducting the marketing and freight costs.

The second option is to buy unfinished weaners and allow them to graze pasture before feeding. For options 1 and 2 BEEFIN calculates the opportunity cost of grazing as the agistment value of the pasture.

The last option is to buy cattle for immediate feeding. The charges for the purchase of stock can be entered into the model as the estimated purchase price, plus freight, from the place of purchase. The model will then calculate the cost of cattle from each source. The full budget can be calculated for which ever of the three options is selected.

Marketing options

Cattle can be sold by live auction, liveweight auction, weight and grade, Computer Assisted Livestock Marketing (CALM), carcass auction or paddock sales. The marketing costs per head range from 50c upwards. Department of Agriculture Farmnote No. 77/88 “Cattle marketing - maximizing net returns” outlines the nature and costs associated with the various cattle marketing systems.
Another computer model, CATMARK, can help producers evaluate the various selling methods. Producers can use this model by contacting their Department of Agriculture district office. Those producers with IBM compatible computers can obtain a free copy of the model by sending a blank diskette to the Department’s Cattle Branch in South Perth.

**Herd health costs**

BEEFIN has a checklist of the various herd health procedures that may be used. These include:

- Vaccine (5-in-1).
- Vitamin A injection.
- Selenium drench, injection or bullet.
- Cobalt bullet.
- Copper injection or bullet.
- Anthelmintic (worm drench).
- Growth promotant.

Local suppliers or the Department of Agriculture’s Farm Budget Guide can provide cost estimates for these products. The BEEFIN model also requires a price for labour ($/hour) plus an estimate of the time taken to carry out the procedures.

**Effluent**

The build up of dung may be a problem, depending on stock density. BEEFIN estimates the amount of dung produced by the cattle that are fed. Sometimes dung can be sold, and the model includes both the cost of removal and a sale value.

**Fixed costs**

Producers sometimes neglect fixed costs when budgeting for feeding enterprises. Fixed costs can be broken down into fixtures and plant. The costs of these items is the current market value (or replacement cost) of that proportion of the item which is used in the feeding programme. The model allows a choice of depreciation life and interest rate for each item. The interest rate used is the “real” interest rate which allows for any unexpected inflation of values during the working life of the item.

**Cattle inputs**

The inputs required for cattle are:

- Number of cattle to be fed.
- Age in years.
- Sex.
- Potential maximum growth rate.

This is the growth potential of a one-year-old steer of initial fat cover 4 mm (fat score 2) at the 12th rib on an unrestricted diet, without a growth promotant, under the particular environmental conditions of the farm. The potential growth rate varies from 1.0 to 1.5 kg/day. The small early maturing breeds are at the low end of the range and the large late maturing breed types at the high end. There is a wide variation among types and breeds. The most reliable specification of maximum potential growth rate is that derived from performance records of similar cattle under similar conditions.

- Fat thickness at the start of feeding.
- Paddock liveweight (immediately before feeding).
- Carcass weight desired at the end of feeding.
- Final fat thickness.

**Feed inputs**

Up to ten feeds can be specified from which ingredients are selected for the formulation of profit-maximizing diets. Estimates of the metabolizable energy, crude protein, long fibre and dry matter contents of each feed must be included in the model. The maximum and minimum allowable proportions of the different feeds in the diet must be specified, as well as their availability. The landed cost of the feed should include the cost of capital up to the start of feeding. The estimated feeding and mixing costs should include labour, maintenance and repair of machinery used.

Cattle grazing pastures in summer and autumn need supplementary feed to finish them for premium prices.
Outputs
BEEFIN formulates up to seven least cost diets ranging in metabolizable energy from 9 to 12 Megajoules per kilogram dry matter in half Megajoule steps. For each of the diets formulated, it predicts the following:

Cattle performance
- Carcass weight gain (kg).
- Final liveweight (kg).
- Expected growth rate (kg/day).
- Number of days on feed.
- Feed conversion ratio.
- Total dry matter required (t).

Diets
- Proportion of each feed in one tonne of the diet.
- Cost of each diet ($/t).
- Total quantity of each feed required (t).
- Total feed cost ($).
- Maximum daily throughput of feed (t/day).

Budget ($/hd)
A summary of the following costs on a $/head basis:
- Herd health costs.
- Feed cost.
- Labour for inspection, weighing, etc.
- Interest.
- Store price.
- Marketing costs.
- Cost/income from the removal of dung and/or its sale.
- Fixed costs.

It then calculates the gross margin as well as the net returns from feeding each diet.

The profit maximizing diet is the one which incurs least total cost. If this diet is unsuitable for feeding, the other diets that were formulated and the resultant effects on profitability can be readily considered. The shadow prices for the various feeds will help farmers compare the costs of each diet. The shadow prices indicate by how much the price of feeds not included in the profit maximizing diet would have to decrease before they would form part of the diet.

Sensitivity analysis
BEEFIN calculates a sensitivity analysis of changes in each of the following prices and values upon profitability of the profit maximizing diet.
- Cost of cattle ($/kg liveweight).
- Price of final carcass weight ($/kg carcass weight).
- Cost of feed ($/t).

Table 1. Effect of change in cost of cattle on the gross margin

| Buying price ($/kg liveweight) | 0.85 | 0.90 | 0.95 | 1.00 | 1.05 | 1.10 | 1.15 |
| Gross margin ($/hd) | 48 | 35 | 23 | 11 | -2 | -14 | -26 |

Table 2. Effect of change in selling price of cattle on the gross margin

| Selling price ($/kg carcass weight) | 2.15 | 2.20 | 2.25 | 2.30 | 2.35 | 2.40 | 2.45 |
| Gross margin ($/hd) | -19 | -9 | 1 | 11 | 21 | 31 | 41 |

Table 3. Effect of change in feed price on gross margin

| Feed cost ($/t) | 100 | 110 | 120 | 130 | 140 | 150 | 160 |
| Gross margin ($/hd) | 42 | 31 | 21 | 11 | 1 | -10 | -20 |

Table 4. Effect of growth promotant and fermentation modifier upon profitability of feeding cattle

| Reduction in days on feed (%) | 0 | 9 | 9 |
| Reduction in feed required (%) | 8 | 8 | 16 |
| Increase in gross margin ($/head) | $10.00 | $12.00 | $22.00 |
Example
The following example illustrates the effect of important factors on the profitability of feeding cattle. The assumptions are:

- Steers with a maximum potential growth rate of 1.3 kg/day.
- Steers enter the feedlot at 250 kg liveweight at $1.00/kg liveweight.
- Steers are sold at a carcass weight of 200 kg and 6 mm backfat for $2.30/kg carcass weight.
- The cost of the diet fed is $130.00/tonne.
- No fermentation modifiers or growth promotants are used.

The gross margin for this example is $11.00/head. Table 1 shows the effect on the gross margin of changing the cost of cattle. Table 2 shows the effect of various sale prices. Table 3 lists the change in gross margin for changes in the cost of the diet.

As these tables show, the prices paid and received for cattle can make or break the profitability of feeding cattle. The use of growth promotants (where allowed) and fermentation modifiers can also improve profitability. Table 4 shows how the use of growth promotants and fermentation modifiers can reduce the amount of feed cattle need, as well as the amount of time on this feed. Table 4 also indicates the likely returns from their use in this example.

Further information

Cattle can be sold by various methods, each with different marketing costs per head.

Feeding cattle out-of-season allows producers to take advantage of high prices.