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TYPES OF CATTLE TO FEED IN RELATION TO THE NEEDS OF MARKETS

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SUMMARY

An outline is presented of the main characteristics in beef required by New Zealand's major overseas markets. A distinction is made between the two end uses of beef, namely table or block beef and manufacturing or grinding beef. The influence of age, liveweight, sex, type, breed or cross of animal on growth rate, and carcass and meat characteristics is discussed briefly. The conclusion is reached that there is ample opportunity to manipulate the feed supplied to the cattle and to select the kinds of animals entering a feedlot so that output and type of beef produced can be matched closely to requirements of markets.

INTRODUCTION

Within the supply of cattle available to a feedlot operator, there is a wide range of types, categorized by weight, breed and cross, age and sex. The performance of each type, relative to its purchase price and return for the finished beast, greatly affects the profitability of the feedlot enterprise. The needs of the markets for beef of a particular kind and the returns for the product in a specified market, require constant study and a concerted attempt to match production to the known requirement of the market. There is, however, some flexibility in this regard and this is where the knowledge and skill of the buyer of cattle, and that of the feedlot manager, meat processor and marketer can be exploited to maximize returns. This paper will consider briefly the needs of markets and then there will follow a general discussion of the types of cattle available to the feedlot manager, how these perform in the feedlot, and the kinds of beef produced by them.

REQUIREMENTS OF MARKETS

In essence there are two main end uses of beef. One is as table or block beef where the product is consumed as steaks or roasts and the other is in manufacturing, processing or grinding in which the beef is changed in form and may be used in a multitude of products on its own, as in hamburgers, or mixed with fat trimmings and/or other substances as in

the case of sausages (Barton, 1971). The characteristics required in these two kinds of beef differ. In table beef, a minimum and maximum fat cover is recognized and the uncooked meat must be attractive in appearance and, when eaten, it should be tender, succulent and flavourful (Barton, 1970). With manufacturing beef, leanness and muscle colour are the two main characteristics sought by the processor. This product should have less than 10% "visual" fat and the leaner and the darker the meat, the more suitable it is for blending with fat trimmings in the production of a wide variety of processed meat products.

Table beef is obtained from prime carcasses, but such carcasses also yield beef which is suitable for processing; indeed some 40% or more of the weight of a Chiller, GAQ or FAQ grade carcass is suitable only for processing purposes. The bulk of the processing beef is, however, obtained from manufacturing grade carcasses which are predominantly cows and bulls.

New Zealand exports beef to a number of countries, but the United States, Canada, Great Britain, Japan, the Pacific Islands and the Carribean area are the main destinations. Most of the manufacturing beef is exported to the United States, but table beef, prepared as boneless, trimmed cuts, is exported elsewhere either in the frozen state or as vacuum-packed, chilled cuts. It is in the table beef trade that buyers lay down specifications as to cutting style, fat cover, marbling (intramuscular) fat content, sex and age of animal from which the beef is derived, carcass weight ranges, conditioning and aging before deboning, fat trimming, packaging, whether the meat is to be frozen or chilled, how the animals are to be fed before slaughter and so on. Space does not permit a full discussion of these matters; suffice it to say that markets differ in their requirements with Japan specifying cuts from heavy carcasses weighing 290 to 330 kg with more covering and marbling fats than other markets supplied by New Zealand and that Great Britain seeks a 3 to 5 mm greater fat cover on table beef than does the United States or Canadian importer.

Other than Japan, none of the present New Zealand markets seeks beef which is heavily marbled with fat within the muscles. There is therefore no compelling present market requirement apart from that of Japan which would recognize, through the pricing structure, beef which is produced by feedlot cattle. And it should be stated that even the Japanese premium may not be adequate to offset the extra costs of finishing cattle in a feedlot.

The reason the Japanese demand heavily-marbled beef is that it resembles their own Kobe beef produced under con-

ditions which could not be emulated in New Zealand (Barton, 1964). The imported beef, in general, does not match the physical appearance or eating qualities of Kobe beef, but it serves as a reasonable substitute especially if offered to unsuspecting visitors to Japan.

Highly-marbled beef when compared with regular beef has been shown by Hawrysh (1973) to have a lower acceptance for texture among trained judges, but it had a slightly higher flavour score. There were no differences in tenderness, aroma, juiciness or overall acceptability between regular and highly-marbled beef. In this study, however, the highly-marbled rib roasts had significantly greater total cooking and drip losses than the regular beef rib roasts. In view of these findings and those reviewed by Barton (1970), it is surprising that so much emphasis in certain quarters is placed on the amount of marbling fat present in choice cuts of beef.

TYPES OF CATTLE TO FEED

The types of cattle which may be selected for finishing in a feedlot are influenced primarily by two factors, first, what is available, and secondly, the requirements of the beef markets. Other considerations, such as buying price for a particular type of beast and the breed or cross also must be taken into account, but only if they relate directly to the needs of particular markets. The performance in the feedlot of various types of cattle and their resulting carcass and beef characteristics differ greatly as the following brief discussion will indicate.

AGE OF ANIMALS

Cattle are offered for sale in broad age categories. They could be young calves of a few days of age, weaners at eight months of age, yearlings, 2-year-olds, 3-year-olds and older. Each age group has special characteristics and these are reflected in the weight gains of individuals, the kinds of rations they require, their maintenance requirements, and whether they are growing or have reached maturity and entered the fattening phase. Breeds and sexes will influence the performance of animals within age groups mainly as these exert some control over the age at which there is a rapid increase in body fat deposition.

Calves

If the objective of the feedlot manager is to feed steer calves of about 180 kg liveweight to reach the Chiller grade at a carcass weight of 340 kg or more, the feeding period would

extend over a long time, and the animals would be fed different rations in the early and later stages. The manager would have more control over their growth rate and he would be able to purchase the calves directly from the man who bred them with the advantage that he could obtain information on their genetic potential and management history. Calves for this type of production should not be fat at purchase; rather they should be large in skeletal size as such beasts are more likely to make faster liveweight gains. This is important as it can affect the profitability of the exercise, especially when the feeding period is long as would be the case in feeding calves through to slaughter at heavy weights and to ensure that the carcasses qualify for the Chiller grade.

Yearlings

Normally yearlings would be purchased in the spring and, for feedlot purposes, large-framed beasts, rather than well-conditioned ones, are required as they make economical and more rapid gains. They also can be taken to heavier weights without becoming overfat and they should be ready for slaughter at about 18 months of age. At that age they would yield a carcass similar to that of calves fed to the same slaughter weight and grade.

Older Cattle

Although cattle two years of age and older are available in relatively large numbers, it is anticipated that steers of this age will, in time, become scarcer. This is because of the increasing emphasis on younger slaughter cattle and also because of improvements in management and the exploitation of superior genetic material resulting in heavier weights and better all-round performance. Older cattle when prime will have a higher degree of marbling in their muscles and their carcass weights will be heavier. These two attributes make them more attractive to the present requirements of the Japanese market.

WEIGHTS OF ANIMALS

There is a correlation between liveweight and age so that what has been stated regarding different ages is generally applicable to cattle of different weights.

Light-weight Cattle

Calves and light-weight cattle (under 225 kg) are cheaper per head, but not necessarily so per kg liveweight, than older and

heavier cattle. They gain weight more efficiently than older and heavier cattle, but capital is tied up for a longer period. Cattle of this age and weight have a higher mortality rate and they require more changes to their rations throughout the period they are in the feedlot.

Medium-weight Cattle

Cattle in the medium-weight range (225 to 330 kg) are usually yearlings and, therefore, have recovered from the effects of weaning. They are better able than calves and light-weight cattle to utilize cheap feed during their early stages in the feedlot.

Heavy-weight Cattle

Cattle weighing more than 330 kg when purchased can be put on to a finishing, high-energy ration as soon as they have settled down in the feedlot some two or three weeks after entering it. These cattle should be fed so that they will be ready for slaughter within 120 days. Older and heavier cattle cost more per head than other categories, but the turnover rate is faster. The cost of feed per kg of gain is high because of their greater maintenance requirements and because of the type of ration offered them.

SEX OF ANIMALS

As far as the meat trade is concerned there are four sex classes: steers, heifers, cows, and bulls. In practice, however, heifers and cows can be spayed and this places them in another category as far as performance is concerned.

Steers

In general, steers predominate in the feedlot situation. This is because they are more readily available, they grow faster than females, they are more settled when confined than bulls, open heifers or cows, and their carcasses are heavier and leaner than those of heifers.

Heifers

These are lighter and fatter than steers at all ages. They mature earlier than steers and their marbling fat content is higher than steers. Heifers available for feeding are usually the culls after the breeder has selected those required for herd replacements. This may mean that the liveweight gains of

those available for feeding could be less as the best have been retained for breeding.

It is necessary for the feedlot operator to ensure that the line of heifers purchased does not contain any animals which are pregnant; otherwise they may be allocated to one of the cow grades at slaughter and thereby attract a lower price.

Non-pregnant heifers have the disadvantage that they exhibit oestrus at regular intervals. This creates a disturbance in the feedlot and probably reduces their rate of liveweight growth. Oestrus can be controlled either by implanting or feeding a substance known as melengestrol acetate (MGA) (Roche and Crowley, 1973) or by spaying. Spaying, however, has been shown by Dinusson *et al.* (1950) and Curran *et al.* (1965) to reduce performance significantly although Robertson *et al.* (1969) observed a non-significant reduction in performance of heifers spayed at a young, but unspecified age.

Cows

The cost of feeding cows in relation to their carcass realization is likely to limit their demand for feedlot finishing. However, there is some evidence (Howes *et al.*, 1972) that young cows 3 to 4 years of age can be fed to produce beef which is acceptable to the Japanese market as it is well marbled if the feeding period is long enough and the ration fed is adequate. Carcass weights of these females should be in the range of 275 to 325 kg according to market information supplied to Howes *et al.* (1972).

Bulls

Although bull beef attracts a high price it is unlikely in the foreseeable future that many bulls will be raised under feedlot conditions. This is mainly because managers prefer to use the feedlot facilities for the production of prime, well-marbled beef. There are a number of reports, however, which indicate that the performance of bulls under feedlot conditions is superior to that of steers (Hedrick *et al.*, 1969; Robertson *et al.*, 1969; Warwick *et al.*, 1970; and reviews by Turton, 1962, 1969). The meat from bulls raised in a feedlot and slaughtered under 400 days of age was found to be comparable in palatability with that from steers and heifers (Field *et al.*, 1966). The incidence of fighting among bulls involving bruising, broken limbs and occasionally deaths is higher than for cattle of other sexes. Some managers experience less trouble in this regard, but the reason why this should be so is difficult to identify.

CONFORMATIONAL TYPES OF ANIMALS AND BREED DIFFERENCES

There are obvious differences in the visual appearance of animals of different breeds, and, within breeds, there is also considerable variation in size, shape, and colour. Some of these differences may be of importance in the feedlot.

Differences between breeds or breed crosses in rate of gain, feed efficiency and carcass and meat characteristics have been demonstrated by numerous investigators (*cf.* MacDonald *et al.*, 1959; Cole *et al.*, 1964; Frisch and Vercoe, 1969; Bond *et al.*, 1972; Adams *et al.*, 1973; Anon., 1973). The larger, leaner breeds or crosses have generally been shown to perform better in the feedlot, but their carcass characteristics and the palatability of their cooked beef do not invariably excel although their yield of trimmed boneless cuts is in their favour compared with the traditional British beef breeds (Adams *et al.*, 1973; Anon., 1973).

Comparisons within breeds based on size and conformation have not been numerous. However, reports (Woodward *et al.*, 1942; Willey *et al.*, 1951; Stonaker *et al.*, 1952) indicate that large Hereford steers compared with small Hereford steers had higher feedlot gains and they required less feed per unit of gain.

It is necessary to utilize in the feedlot cattle which have been bred for enhanced liveweight gain as these will also be more efficient in converting feed eaten to liveweight gain (Gerlaugh *et al.*, 1953; Tallis *et al.*, 1959; Klosterman, 1972). Thus it is highly desirable to know the genetic and management history of the store stock entering the feedlot. But above all, it is imperative for the manager to know in detail the requirement of the market to which the beef from his feedlot is to go; without this information and its application, production from the feedlot may not meet the needs of the beef market. There is plenty of opportunity to manipulate the feed, the rate of liveweight gain, the degree of finish, the age and sex of the animals and the type, breeds and crosses of the cattle entering the feedlot. It is these variations which provide the opportunities to match production and type of beef with market requirements. The successful manager is the person who does this best.

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