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The role of beef breeding cows in strategic management of feed supply under pasture variability

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Abstract

The ability of the beef cow to buffer herself against pasture variability by losing liveweight at certain periods in the production cycle is reviewed. The point is made that this attribute of the beef cow can be used to buffer other enterprises on the farm less able to cope with variability in pasture feed supply. It is suggested that a farm livestock policy should include livestock classes like the beef cow which, because of their ability to buffer against variability in pasture feed supply,canresultinamoreefficient, and more economic use of pasture on the farm.

Keywords Beef cow, nutrition, pasture variability, flexibility, buffering capacity, risk management

Introduction

The key to the management of pasture on hill country is the recognition that pasture is a variable resource. The more diverse the landscape and the more extreme the climate, then generally, the greater the variability in pasture production, between fields, between seasons, and between years. Where the topography is broken there is the additional problem of estimating with sufficient accuracy to be useful how much pasture mass is available for grazing.

Commonly there have been two ways of coping with variability in the availability of pasture mass for grazing.

1. Cover the feed deficits that occur with supplementation. The greater the feed deficit the greater the supplementation required. This option is expensive, and likely to become more expensive in the future.
2. Operate avariable buying and selling policy livestock. If available pasture mass falls below a critical level then stock are sold. If pasture mass is greater than expected then buy in stock. This policy is subject to the vagaries of supply and demand of suitable livestock, and has become less attractive in circumstances where prices vary and the cost of capital is high.

A third option, the theme of this paper, is the use of a class of animals whose production is relatively insensitive to changes in the supply of pasture mass. A herd of beef breeding cows is an attractive class of livestock to carry in these circumstances.

Flexibility

We define the flexibility of a class of livestock to be the change inproductionper change in feed availability. For example, the flexibility of a flock of sheep kept for wool production would be the change in the weight of wool produced per change in the pasture mass available to the sheep. If production changes considerably, relative to changes in pasture availability, then the livestock enterprise is inflexible at that level of feed availability. If available pasture mass can change a lot without changing production then the livestock enterprise is regarded as being flexible. Note that the relative flexibility of an enterprise will depend on the absolute amounts of pasture mass available at which the changes occur.

Typically inflexible enterprises are also the most profitable enterprises, but with substantial economic loss should production goals not be met. For example, lambs contracted for slaughter with penalties on the failure to meet specifications. If the farmer assigns sufficient resources to an inflexible enterprise to ensure success, then there will be a waste of resources in normal years. Successful management of variable supplies of pasture mass depends on the use of flexible classes of livestock which can be used to buffer the needs of inflexible classes of livestock. Among the most flexible classes of livestock on the farm is the beef cow, and this paper will establish the case for this role for the cow.

A spring-calving beef cow shows flexibility at three periods.

1. Liveweight losses over the winter;
2. Level of energy intake following calving;

3. High pasture mass intake and speed of liveweight recovery during the spring pasture flush.

Flexibility of the beef cow over the winter

It is well established that spring calving beef cows can lose liveweight over the winter, though the extent of the liveweightlosspossibleisnot widely appreciated. Reports have shown that a liveweight loss of 15% of the autumn (March) liveweight upto a point 4 weeks before calving has no important or economic effect on the production of the cow, in fact generally appears to improve production, paticularly in rebreeding performance (McCormick 1967; Pope 1967). Production is defied as the weight of calf weaned and the time of reconception of the cow. This means that an Angus cow weighing 475 kg in March can weigh 400 kg 4 weeks before calving without sacrifice ofproduction. This liveweight includes the weight of the conceptus, so the actual liveweight of the cow will be lower than 400 kg. Thepathofliveweight loss has no effect (Pleasants & Barton 1985).

Provided the cow does not lose liveweight over the 4 weeks before calving her performance will not suffer. A degree of liveweight gain in this period is recommended, but may not improve performance (Bellows et *al.* 1979; Drennan 1977; Anderson *et al.* 1985; Preston & Willis 1970), the liveweight gain being associated with greater liveweight loss of fluids atcalving (Jobert 1954; Anderson *et* 01.1985; Pleasants & Ginindza 1981). The primary benefit of liveweight gain 4 weeks before calving is to allow flexibility in post-calving management.

How much liveweight a spring calving cow can lose over the winter is not known. The 15% loss of autumn liveweight quoted seems a safe figure. Some trials have reported satisfactory performance in cows weighing initially 530 kg followed by a 25% winter weight loss (Pope 1967). This amount of weight loss meant that the cows weighed about 400 kg close to calving suggesting that generally the actual liveweight at calving is the important variable, not the autumn liveweight from which weight loss began. This view is supported by Oliver & Richardson (1976). and Lamond (1970), but further work is needed in this area.

For some farmers management of the spring calving beef cow is complicated by the occurrence of metabolic disorders which can happen at calving. Many farmers feed their cows at high levels of nutrition over the winter to try to alleviate this problem. However, the evidence strongly suggests that high levels of winter nutrition actually promote the problem (Scales *et al.* 1977; Baker & Gould 1976). One way to avoid metabolic disorder is to manage cows to lose some liveweight over the winter.

Flexibility of the beef cow in the spring

After calving about 40 days elapse before the calf can fully utilise the amount of milk the cow can produce. Provided the cow has calved in satisfactory condition (eg. lost less than 15% of autumn liveweight) then over the 40 days following calving the cow need not be fed to gain liveweight (Nicoll 1979; Wright & Russel 1987; Pleasants & Barton 1979; Nicol & Sharafeldin 1975; Richardson *et* al. 1977). Indeed Russel(l98 1) showed that Angus cows maintained milk production in early lactation despite levels of nutrition below maintenance. However, Topps (1976), and Wright *et al.* (1986) present evidence that cows producing higher milk yields are much more susceptive to level of energy intake, especially on reproductive performance, than cows with lower milk yields, suggesting that some breeds may be more adaptable to low postcalving nutrition than others. Switching to a high plane of nutrition 40 days after calving boosts the milk production of the cow and improves the growth rate of the calf (Lowman *et al.* 1979; Furr & Nelson 1964; Pleasants & Barton 1979; Nicol & Sharrifin 1975). Ifprecalving nutrition has been low, and cows have calved in less favorable condition (eg. lost more than 15% of autumn liveweight), then liveweight gain over the period following calving is important to ensure that cows return to oestrus in time to be bred. This interaction between pre- and postcalving nutritional levels was established by Wiltbank *et al.* (1962). and supported by the work of Nicoll(l979).

Topps (1976) reviewed a number of trials and concluded that there is no evidence that liveweight gain before or during the breeding season influences conception, even when cows have lost liveweight after calving. This view is supported by Lamond (1970). Holness et *al.* (1978) and Oliver & Richardson (1976). However a satisfactory liveweight at breeding is implicated (Steenkamp *et* al. 1975), though there are few results to give guidance. Ward (1968) suggests as a rule of thumb that cows should be within 5% of their autumnliveweight at the start of mating for satisfactory reconception, a view supported by Richardson *et al.* (1975).

Flexibility **of the beef cow in the spring pasture flush**

On exposure to high levels of nutrition coinciding with the onset of the spring pasture flush, the cows, with calves at foot, gain liveweight with remarkable speed, in excess of 1 kg / day for cows that are less than their mature liveweight (Hight 1968). This is fortunate since ability to consume large amounts of pasture is valuable at this time of the year for control and improvement of grassland (Bircham 1977). Thus the cow herd can be

used to prepare pasture for the use of other classes of livestock later in the season.

Quantitative description of flexibility

Our definition of flexibility in a livestock enterprise invites quantitative description. However, the errors involved in the determination of animal requirements (Joyce *et* al. 1975) imply that this will be inaccurate. Furthermore, there is convincing evidence that maintenance requirements fall as animals adapt to low planes of nutrition (Elliot *et* al. 1966; Jenkins & Ferrell 1983; Ferrell and Jenkins 1985; Jenkins *et al.* 1986; Taylor *et al.* 1986).

However, an approximate calculation can be used to show the potential of thinking in terms of the flexibility of an enterprise. The decision supportroutine 'Stockpol' described by Marshall & McCall (1991) estimates that a beef cow weighing 475 kg in March and losing 15% of this liveweight 4 weeks before calving, compared to losing 10% of this liveweight 4 weeks before calving, would save 50 kg pasture mass per cow. A 100 cow herd would save 5000 kg pasture mass, sufficient to supply 500 30 kg lambs 1% of their liveweight in pasture mass for 30 days. Removing this amount of pasture mass from 500 lambs for 30 days could reduce liveweight gain from 150 g/day to 50 g/day, a substantial loss. But as noted the beef cow enterprise will not suffer any economic loss, provided post calving management is adequate.

The property 'Big Hill' situated just north-east of Taihape carries approximately 18,000 stock units. From the end of April to the beginning of August 394 mixed age cows are grazed on a 100 day rotation behind 9,500 ewes, which are preceded by 4,500 hoggets and 135 rising two-year-old heifers. Paddock size averages 30 hectares. Then for a further 30 days the mixed age cows are forced to clean up roughage with the late lambing ewes. Four weeks before calving begins the cows are break fed from 82 hectares of saved pasture to allow liveweight gain before calving. As cows start calving at the beginning of October they are spread out with the hoggets to take up excess spring pasture growth. Later cows and calves are rotated with ewes and lambs until the lambs are weaned. Then cows and ewes are grazed together until the end of April when the winter grazing rotation begins.

In the grazing system adopted on 'Big Hill' the beef cows, as the last animals on the grazing rotation, are expected to absorb most of the variability in feed supply over the difficult winters that are experienced in this part of the country. Indeed we consider that many times there is nil pasture available for the cows and their intake is made up from dead thistles, rushes, scrub, etc. The management plans for the cows to lose 12% to 15% of their liveweight over the winter. However there is scope for further liveweight loss, as was the case in the severe summer and winter drought that was experienced in 1985. Some flexibility was gained by weaning the calves early in February. Lack of feed resulted in the cows losing more than an estimated 25% of their liveweight over the following winter (cows were stressed to the point where activity like weighing was avoided), with very little pasture available for feeding before calving, as the cows were used to buffer the other farm enterprises from the drought. Later, when cows reached a critical point when further falls in liveweight would have caused deaths, they were maintained by taking one paddock out of the winter grazing rotation and break feeding the cows. The consequence of this was that cow losses were 3% to 5% higher, and calf weaning weights an estimated 10kg to 15 kglighter.Cowsgainedliveweight fast in the spring pasture flush and suffered no further effect from this difficult season. However the protection from the drought that the cows were able to offer the other enterprises on the farm illustrates our pointregarding the importance of maintaining a flexible class of livestock like beef cows on a farm.

If pasture supply is poor in the spring the beef cow enterprise is flexible. These animals can be fed to maintain, or even lose, liveweight up to about 40 days after calving; so pasture mass at this time can be diverted to inflexible, but profitable enterprises.

Following the onset of the spring pasture flush whencontrolofpasturesbecomes difficult,thecapacity for intake associated with the rapid gain in liveweight for the beef cow can assist pasture management programs.

Conclusion

There are, of course, other reasons besides flexibility in maintaining a relatively unprofitable enterprise like the beef cow on a farm. The propensity of the cow to eat weeds ignored by other classes of domestic animals in the same field, and her role in pasture development and improvement are well known (Suckling 1975; Bircham 1977). It is the objective of this paper to point out a further role for the beef cow. Management of risk in a livestock operation is a topic rarely addressed by scientists, but rarely forgotten by farmers. The assistance of a beef cow enterprise in the management of risk deserves careful consideration. The role of the beef cow in buffering the effects of the drought on 'Big Hill' illustrates this point.

A more general consideration of the concept of flexibility in livestock enterprises, and its place in

coping withpasturevariability, is warranted. Objective measurement is needed so that optimal mixes of livestock enterprises can be ascertained according to the degree of variability in pasture supply that might be expected. In the future the ability of a livestock policy to cope with variability in pasture supply would be as important a consideration as the expected profitability of that enterprise when considered as part of a mix of enterprises on the farm.

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