

## SUPPLEMENTARY FEEDING FOR DAIRY PRODUCTION IN THE TROPICAL REGIONS OF AUSTRALIA

### 2. REVIEW OF FARMING PRACTICE

J. N. SALKELD\*

#### INTRODUCTION

The basic principles of feed supplementation for dairy cattle in a tropical environment are no different to those applied in temperate regions. Dairy cattle of the one breed, of equal body weight in both situations require the same balanced nutrient intake to produce a given volume of milk of similar composition. The supplementary feeding of dairy cattle is defined as "the provision of feed in addition to that available from grazing". Quality and quantity of available grazing material influences the introduction of supplementary feeding to a dairy farming system and is practised to meet specific needs. The needs arise from

- (1) Shortages of pasture
- (2) Imbalances of pasture nutrients
- (3) Reductions in body weight of animals
- (4) Desire to achieve predetermined production responses
- (5) "Cow contentment" during the milking process.

To illustrate the acceptance and practice of supplementary feeding in a tropical environment this paper presents the situation as it occurs in the Richmond and Tweed valleys of the far north coast of New South Wales.

#### DESCRIPTION OF THE AREA AND PRODUCTION TRENDS

Dairy farming in the Richmond and Tweed valleys extends approximately 100 miles south of the Queensland border and west of Cape Byron to the eastern side of the Richmond Range. Cream and milk are produced on 2400 farms operating in this area. Climate is typically sub-tropical with the frequent occurrence of dry spring periods and cyclonic conditions during late summer and early autumn. The annual rainfall varies from 43 in. in the south west to 70 in. in the north east. Occasional flooding adversely affects dairy production in both valleys.

Breeds of dairy cattle in the area are Jersey, Australian Illawarra Shorthorn, Guernsey, Friesian and Australian Milking Zebu. Although Jerseys are dominant, Friesians are increasing in numbers and popularity. The development of the Australian Milking Zebu is being followed with interest.

Naturalised pastures of paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*), carpet grass (*Axonopus affinis*) and to a lesser extent Rhodes grass (*Chloris gayana*) are major contributors to the feed supply. In addition to these grasses, improved temperate and tropical pastures provide an important source of feed on 46% of the farms. Naturalised white clover (*Trifolium repens*) has contributed less to the feed supply particularly since the introduction of nitrogen application to grass pastures. Oats (*Avena spp.*) is the most widely grown winter crop.

Topography of the valleys varies from precipitous in the upper reaches of the river systems to low lying flood plains. Thirty-three per cent of the farms have differing soil types varying from mixtures of red and chocolate basalt to alluvial. Alluvial soils are dominant on twenty-six per cent of the farms while 20% are on an extensive red basalt plateau.

---

\*Department of Agriculture, Lismore, N.S.W. 2480.

Dairy production is mainly seasonal to take advantage of growth of naturalised pasture and to offset the effects of seasonal conditions. The effect of seasonal conditions on production is shown in Fig. 1. The average butterfat production per cow is low. It varies from 153 lb in the Lismore district to 180 lb in the Murwillumbah and Kyogle districts.

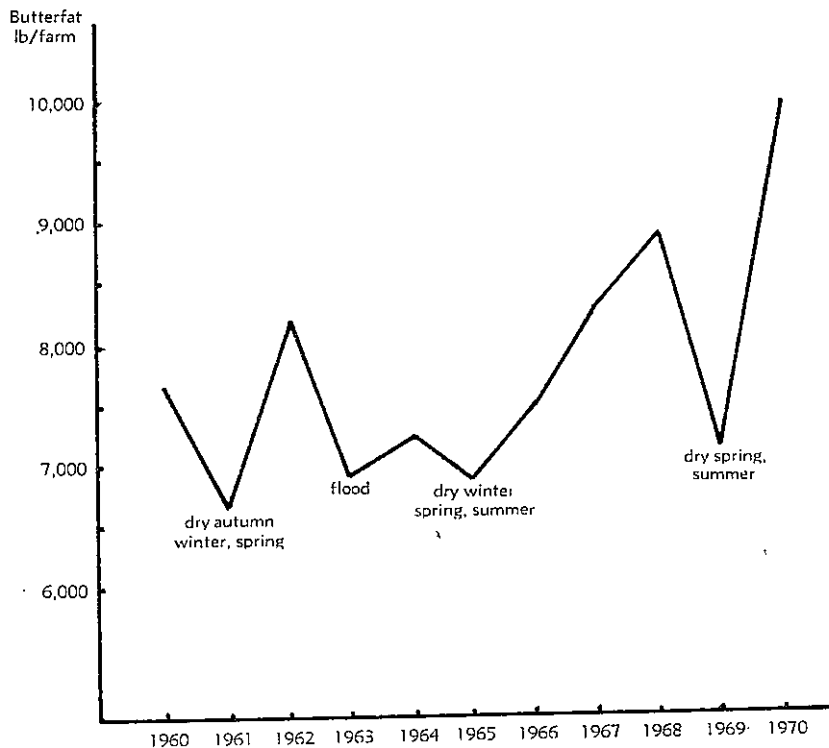


Fig. 1. Effect of seasonal conditions on average butterfat production per farm.

#### SOURCE OF INFORMATION

Information on supplementary feeding is based on:—

- (1) Field experience in the dairying districts of Lismore and Murwillumbah.
- (2) A survey of 130 dairy farms by questionnaire representing 5% of the total.
- (3) Special visits to 17 dairy farmers in the Richmond and Tweed valleys during the period November 1970 to March 1971.

To provide a representative sample, farms supplied with the questionnaire were selected on the basis of:—

- (a) Type of product consigned to factories i.e. whether milk or cream.
- (b) Dominant soil type.
- (c) Locality.
- (d) Approximate production grouping i.e. high 15000 lb butterfat per annum or more, medium 8000 to 14000 lb butterfat per annum and low less than 8000 lb butterfat per annum.

and (e) Feeding systems.

## RESULTS OF SURVEY

The results of the survey show that 58% of the dairy farmers feed concentrates throughout the year, primarily for "cow contentment". Farmers are reluctant to cease supplementary feeding for this reason during times of lush pasture growth. The absence of feed during milking creates individual cow disturbances and is considered to affect milk production. Other reasons for concentrate feeding are:—

- (a) To maintain uniform production under changing weather conditions.
- (b) To offset losses in body condition, particularly during late lactation and pre-partum or during the onset of stress conditions.
- (c) To supply essential minerals, such as calcium, magnesium and phosphorus, which could be lacking in available pasture.

### *Supplements provided*

#### *Concentrates*

An extensive range of energy and protein concentrates are available in the area. Commercial dairy meals, bran pollard and home grown cracked maize grain are the major concentrates used. Forty-one per cent of farmers purchase ready mixed commercial dairy meals and feed direct to stock while 13% buy the raw ingredients and mix them on the farm prior to feeding. Twenty-two per cent grow their own feed requirements in the form of maize grain and use it after hammer milling or cracking. In a majority of cases the core of the cob and/or the husk is included with the cracked grain. To exercise greater control over the composition of the concentrate and to offset costs, 24% of farmers grow a proportion of their requirements and purchase the rest. These purchases are generally industrial by-products. The composition of the concentrate used is based on individual farmer's assessment of pasture quality available. Whether purchasing ready mixed commercial meals or formulating their own mixtures, 19% of farmers considered protein as the most important ingredient. Seventy-seven per cent considered both protein and the energy portions of concentrates equally important. The remaining 4% of farmers rated energy as the most important portion of supplements stating that protein was over rated under grazing conditions of the North Coast.

The survey showed that a majority of farmers are aware that the application of nitrogenous fertilisers, in addition to promoting growth, also increased the protein content of grasses. However, they have a very limited knowledge of the nutritive value of pasture species at different stages of maturity.

#### *Conserved fodders*

Conserved fodders in the form of hay or silage, although a valuable source of supplementary feed, are not made to any extent because of the difficulties and uncertainties encountered during the conservation process. The amount of labour required during the harvesting and storage, the shortage of suitable machinery in the area and weather variables are factors which prevent widespread adoption of hay or silage making.

#### *Green chopped fodders*

Green chopped fodders from crops of maize, sorghum, temperate improved pastures, lucerne and cow cane are used only on five known dairy farms in the valleys as supplements to grazing. In view of the small number of farms involved, this aspect will not be covered.

*Quantity of supplement fed per day*

To achieve optimum production and maintain body weight of a milking cow it is necessary for feed intake to be nutritively balanced and of sufficient quantity. It was surprising, that a majority of farmers did not know how much pasture cows were eating or capable of consuming during a 24 hour period. Calculated guesses ranged from 30 lb to 80 lb of fresh material.

The quantity of supplement fed is usually an amount which the cow can consume during her period in the bails. This quantity is invariably insufficient to maintain bodyweight or level of production during periods of pasture shortage, but can be in excess of requirements when pasture herbage is plentiful. An attempt is made to vary the quantity of concentrate eaten by each cow by varying the texture, finely ground supplements taking longer to consume. In determining the quantity of concentrates fed, 58% of the farmers did not take into account

production,  
stage of lactation,  
or body condition.

It is significant that all cows in 69% of the herds surveyed, irrespective of the above three points, received equal amounts of concentrate. Production was the criteria used in 3% of the herds and 7% according to stage of lactation. Another 7% fed according to body condition. The remaining 14% of herds were fed according to production, stage of lactation and body condition.

The average weight fed per cow per day was 3 lb. Farmers did not feed more than 4 lb per day or less than 1 lb.

*Practical problems of supplementary feeding in the area**Variations in composition of feeds*

Dairy cattle are very sensitive to any major compositional changes that are made to a feed supplement. The addition of, or variations in the amount of industrial by-products in a feed mixture can cause total rejection of concentrate. Thirty-nine per cent of the farmers in the survey had experienced difficulty in getting cows to eat concentrates when mixtures were altered. They stated that cows were more sensitive to changes when meat meal was involved but if the variations were introduced to cows gradually, feed intake was not affected.

*Method of feeding*

Feeding supplements in milking bails offer a farmer the following advantages:—

- a) Little or no additional capital expenditure
- b) Labour required to measure feed is incorporated in labour used during milking
- c) Cows are not so easily disturbed during the milking process
- d) Special arrangements are not required to have cows enter the bails.

The main disadvantage of the method is that animals cannot always consume quantities of feed to suit the needs of the cow for maximum production. Limitations are placed on the time available for feed intake because of the milking routine. There is also a problem of dust contamination within the dairy premises.

*Availability of supplements*

Feed supplements are almost universally based on grains or their by-product to provide the energy portions of a ration. The area, because of climate and soil types is suited only to growing limited quantities of maize, and grain sorghum for grain. Greater limitations are placed on growing and harvesting cereal grains. This

situation makes it necessary to import the remainder of grain requirements from western areas of New South Wales, Queensland and Victoria. Grains grown in these areas show large variations in quality which creates problems for feed merchants when formulating commercial meals.

#### *Storage facilities*

Even though 58% of farmers in the survey practice supplementary feeding it is extremely rare in the district to see grain silos or vermin proof storage facilities provided. Unless adequate storage facilities are provided, purchase or harvested feed will deteriorate or be lost. The provision of such storage enables farmers to buy feed from other areas when cost is lowest.

#### *Heat stress*

Feed intake during hot summer months is reduced when milking cows are observed seeking shade and shelter. This has a depressing effect on production. Dr. J. M. Rendel, in a paper presented at the XVIII International Dairy Congress in Sydney, October 1970, stated that "Prolonged heat stress reduced feed intake and milk production". Increase in feed intake could be achieved by supplementary feeding at milking time when daytime temperatures are lowest.

#### *Willingness to graze*

It is noted immediately after milking that cows being supplementary fed are less likely to graze of their own accord, particularly at the end of lactation. In this situation pasture intake could be reduced.

### DEFICIENCIES IN AVAILABLE TECHNOLOGY

Knowledge of the response to supplements by dairy cows grazing tropical pastures is very limited. There is a need to provide information, through research, to enable farmers to practise supplementary feeding in relation to the current condition of pastures and the amount available per cow. Further information will be needed on the composition of pastures and home grown grains, although even present knowledge can provide a guide on protein and energy contents.

The survey showed that more training is required for feed technologists. Knowledge of supplementary feeding technology would result in better feed mixes, improved guidance to farmers and ultimately better feeding practices.

### CONCLUSIONS

- 1) The majority of farmers feeding supplements throughout the year do so primarily for cow "contentment". A smaller proportion feed for production.
- 2) The feeding of concentrates in the bails restricts the amount that can be fed.
- 3) The use of locally conserved fodders as feed supplements is restricted because of climate.
- 4) Farmer knowledge of the feed requirements of dairy cattle is limited.
- 5) Much more information is needed on the response to supplements of cows grazing tropical pastures.
- 6) Insufficient information is available on the nutritive values of pastures and crops at varying stages of maturity to enable a more accurate application of supplementary feeding.

## ACKNOWLEDGEMENTS

The assistance and ready co-operation of dairy farmers in the Richmond and Tweed Valleys in the conduct of the survey and in subsequent discussions is gratefully acknowledged.

The assistance and constructive comments offered by the following persons are gratefully appreciated.

COOMBER, A. R. Department of Agriculture, Lismore.

HARTRIDGE, F. J. Department of Agriculture, Lismore.

KRATZ, J. D. Department of Agriculture, Kyogle.

NOBLE, W. S. Department of Agriculture, Casino.

SALT, V. R. Department of Agriculture, Murwillumbah.

SIMONS, N. Norco Co-op Dairy Company, Lismore.

SJOSTEDT, J. P. Department of Agriculture, Murwillumbah.

YABSLEY, G. M. Department of Agriculture, Murwillumbah.

## DISCUSSION

### *Protein and energy supplementation*

*Whereas the need for protein supplementation of cows grazing tropical pastures appears to have been over-emphasised, energy supplementation can be used to advantage to increase milk yields. Experimental results from temperate environments are used as a basis for supplementary feeding recommendations in the tropics, because insufficient work has been done on this subject in the latter environment. The validity of these recommendations for the tropical environment may be seriously questioned.*

### *Response to supplementary feeding*

*There is a lack of information on the milk production response for various levels of supplementation from cows grazing tropical pastures of varying quality and at various grazing pressures. The effect of body condition on the response to supplementary feeding is not understood. More research is required specifically on these aspects of supplementary feeding.*

### *Evaluation of feeding experiments*

*The lack of information on the importance of carry-over effects indicates a need for more long term field experiments to evaluate responses to supplementary feeding. However, short term experiments are a valuable means of studying certain aspects of supplementary feeding, e.g. assessing the relative value of different supplements and determining likely responses.*

### *Level of farmer understanding*

*It is evident that farmers have not generally accepted even simple supplementary feeding practices. "Cow contentment" appears to be the main criterion adopted at the farm level for supplementary feeding. Although there are no defined supplementary feeding practices for the tropics, the poor understanding of basic supplementary feeding principles by farmers indicates the need for improved extension.*

### *Future research*

*As the main interest is in supplementing animals at pasture, the most important research need is a study of the relationships between pasture availability and the level of supplementation. Other important aspects of research are the effects of body condition at calving on the response to supplementary feeding, and a broad definition of the potential production responses over the pre-partum and early lactation periods.*