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A Simple Feeding Guide . . .

BALANCED RATIONS
FOR DAIRY COWS

By K. NEEDHAM, B.Sc. (Agric.), Dairying Division.

MANY technical articles have been written on the nutrition of dairy cattle and the methods employed in compounding a balanced ration have often been explained.

Various systems have been outlined but it can often be said that as far as the practical dairy farmer is concerned he is not much wiser after reading them. Many do not even try to use them because they look too complicated.

This article aims to present the principles of compounding a balanced ration in a simplified form, and suggests rations which should be easily adopted on any dairy farm. It may be criticised for technical inadequacies, or for over-simplification, but it is felt that such failings are justified if the suggestions are adopted. If a farmer is able to get somewhere near a correct level of feeding—even though it is not precise—he will be a much better dairy farmer than if he has never tried.

Authorities will probably always differ on the precise nutritive requirements of a dairy cow, but there are a few simple well defined principles which can be profitably used both for increasing and maintaining production, and for preserving the compositional quality of the milk.

The following notes should be taken as a guide only, for average situations. Greater detail is available from officers of the Department of Agriculture.

FOODSTUFFS AND THEIR COMPONENTS

The cow, being a ruminant, is capable of turning large quantities of relatively poor quality material into rich foodstuffs. It is able to efficiently utilise bulky foods such as pasture, hay and silage.

All foodstuffs contain:—
  PROTEINS—to build flesh.
  FATS—to provide fat and act as a store of energy.
  CARBOHYDRATES—to supply quick energy.
  MINERALS—to provide the skeleton and maintain health.
  SOME VITAMINS—for health.

The ultimate purpose of PROTEINS, FATS and CARBOHYDRATES is to meet the daily requirements of the cow for growth, maintenance and production.

The food requirements can be divided broadly into two groups:—

1. MAINTENANCE—of the normal daily functions of the body such as walking, breathing, excretion, and reproduction.
2. PRODUCTION—the manufacture of milk.

Any ration supplied to the cow must contain ingredients, combined in such a way that it will provide for maintenance and production of the individual cow.

MAINTENANCE requirements will vary according to a number of factors, the most important of which is body weight. For example, Jerseys will need less than Friesians.

PRODUCTION requirements will vary according to the number of gallons of milk produced and its butterfat content. Beyond supplying these conditions the correct formulation of the ration is necessary to ensure that the composition of the milk, in terms of fat and solids-not-fat, is adequate.
THE RATION

The term ration is used here in the broadest sense to include all food consumed by the cow—grazing, hay, silage, concentrates.

Balanced Ration

For the ration to correctly supply the needs for maintenance, production, and quality or composition of the milk, it must contain the various components in the right proportions. When it does, it is a balanced ration.

If it is unbalanced it is wasteful. To balance a ration we must know certain details about a foodstuff, including the amounts of protein, carbohydrate and fat, the digestibility of the components, and their various energy values. Rather than attempt to list these and describe the details of utilising the information to balance the ration, an attempt is made later to prescribe certain combinations of foodstuffs which the dairy farmer can use to come close to supplying a balanced ration at different times of the year.

Intake of Dry Matter

According to the size of the cow in the main, and other conditions to a lesser extent, it can consume a certain amount of dry matter.

For example, 100 lb. of green pasture consists of about 90 lb. of water and 10 lb. of dry matter. The dry matter intake of an animal consuming 100 lb. of pasture may therefore be said to be 10 lb.

The dry matter intake is important, not the total weight of material consumed.

The dry matter requirement for maintenance and production can be estimated from the knowledge that a cow requires about 3 lb. of dry matter a day per cwt. of live weight. Thus Jerseys and Guernseys will require about 18 to 20 lb., A.I.S. 25 to 27 lb. and Friesians 28 to 30 lb. Higher producing cows will require more.

Another rough guide is that for the maintenance ration alone the dry matter can be estimated by doubling the live weight in hundredweights and deducting two. Thus an 8 cwt. cow would require $8 \times 2 = 16 - 2 = 14$ lb. dry matter for maintenance.

The Requirements of a Balanced Ration

A balanced ration must contain all the essential foodstuffs in the correct proportion and must be available to the cow in a quantity which will supply enough dry matter to provide maintenance and produce the number of gallons of milk which the particular cow is capable of yielding.

Wasteful Feeding

There is a tendency on the part of some people to decide on a supplementary ration and then to continue to feed it, regardless of paddock feed variations. This system is obviously wasteful. Too much is just as uneconomic as too little.

Feeding and the Composition of Milk

As a general rule, if fats are low, increase the fibre in the form of hay, or oat husks.

If S.N.F. is falling, increase the energy, for example in the form of cereal grains.

From the nature of the West Australian growing season for pastures, we can expect to need to keep the fibre intake up during autumn, winter and early spring and the energy and protein intake up during late spring, summer, autumn, and the early part of winter, depending upon the district.

Feeding the Individual Animal

To make the best use of balanced rations the cows in the herd must be considered individually and the dairy farmer must FEED ACCORDING TO PRODUCTION to get the best out of the animals most economically.

To do anything more than outline broad mixtures for feeding from the office chair is unsatisfactory. In the final analysis it remains for the observant farmer to decide when and to what extent supplementation is desirable.

By observing the condition and abundance of his pastures he will have to decide when to commence or discontinue the feeding of hay and silage and finally, according to production, when and to what extent any additional feeding in the form of supplementary concentrates is indicated.

Forms of Supplementary Feeding

1. HAY and SILAGE.
2. SUMMER FODDER CROPS—Sudan, Sorghum, Maize.
3. CONCENTRATES—cereal grains, meatmeal, linseed meal, pollard, grain.
SUPPLEMENTS TO GRAZING AND SUGGESTED RATIONS

Cows on good grazing should not require supplementation up to and including three gallons of milk a day.

When pastures have dried off there will be an increasing need for supplementation for cows producing more than two gallons

A.—FOR COWS ON PASTURE

For cows on grazing which is providing for maintenance and some production the following supplements are suggested. (1) In each case the quantity specified should be allowed for each additional gallon of milk to be produced by the cow, above what she can produce on pasture alone.

Mixture A:
20 parts crushed wheat;
10 parts linseed meal;
5 parts meatmeal.

3 1/2 lb. of the mixture contains nutrients for one gallon of milk.

Mixture B:
20 parts oaten chaff;
10 parts bran;
5 parts meatmeal.

5 lb. of the mixture contains nutrients for one gallon of milk.

Mixture C:
12 parts linseed meal;
8 parts crushed wheat.

4 lb. of the mixture contains nutrients for one gallon of milk.

Mixture D:
50 parts bran;
10 parts crushed wheat;
5 parts meatmeal.

5 lb. of the mixture contains nutrients for one gallon of milk.

Mixture E:
27 parts crushed wheat;
8 parts meatmeal.

3 1/2 lb. of the mixture contains nutrients for one gallon of milk.

Mixture F:
20 parts bran;
6 parts dried skim milk.

5 lb of the mixture contains nutrients for one gallon of milk.

B.—FOR COWS NOT RECEIVING PASTURE

At some times of the year grazing can be almost completely disregarded for production. The following rations are suggested for these circumstances and provide nutrients for maintenance and two gallons. For productions beyond two gallons additional supplementation at the rates shown in Section A above will be required.

Ration 1.
20 lb. meadow hay;
4 lb. linseed meal;
2 lb. crushed wheat.

Ration 2.
20 lb. oaten hay;
6 lb. dried brewers’ grains;
1 lb. meatmeal.

Ration 3.
40 lb. mixed silage;
12 lb. meadow hay;
8 lb. dried brewers’ grains;
4 lb. bran.

Ration 4.
50 lb. clover silage;
10 lb. meadow hay;
5 lb. crushed wheat;
2 lb. meatmeal.
Ration 5.  
32 lb. green maize;  
10 lb. oaten hay;  
8 lb. bran;  
2 lb. linseed meal.

Ration 6.  
17 lb. meadow hay;  
5 lb. lucerne hay;  
4 lb. proprietary foods (16% crude protein);  
1 lb. meatmeal.

Ration 7.  
22 lb. meadow hay;  
6 lb. bran;  
2 lb. meatmeal.

Ration 8.  
15 lb. lucerne hay;  
10 lb. meadow hay;  
4 lb. crushed oats;  
1 lb. linseed meal.

Ration 9.  
22 lb. meadow hay;  
5 lb. bran;  
2 lb. dried skim milk.

Ration 10.  
30 lb. green lucerne;  
17 lb. oaten hay;  
2 lb. dried buttermilk.

Ration 11 (').  
20 lb oaten hay;  
6 lb. dried brewers' grains;  
1 lb. meatmeal.

Ration 12 (').  
40 lb. mixed silage;  
12 lb. meadow hay;  
8 lb. dried brewers' grains;  
4 lb. bran.

PROPRIETARY SUPPLEMENTARY FOODS
The idea still remains in the minds of some farmers that a difference exists between a supplementary ration prepared on the farm and one purchased from a stock food manufacturer. This is false.

The same requirement applies to both—they must be balanced. The choice of which is to be used is a personal one and depends on the economics involved.

If a farmer chooses to purchase prepared supplementary foods he should examine the analysis provided. Generally speaking proprietary rations prepared for production are fed at the rate of 4 lb. per gallon of milk, but if any doubt exists the manufacturer or the Department should be consulted.

MINERALS

No article on feeding would be complete without a reference to the need for an adequate mineral intake. Minerals are required for skeletal structure, and to avoid certain deficiency diseases. For greater detail and to meet varying circumstances reference should be made to Department Bulletins 2243 and 2682.

As a general guide the following will be useful:

Phosphate Lick (')

It is desirable to feed a phosphate lick to dairy cows at all times, and particularly during the summer. Two useful licks are:

1. 100 lb. ground rock phosphate;  
   50 lb stock salt.

   Feed from 2 to 4½ oz. per day per milking cow according to production.

2. 100 lb. ground rock phosphate;  
   100 lb. boneflour or bonemeal;  
   50 lb. stock salt.

Suitable for highly productive cows where it is desired to lessen the risk of feeding excess fluorine. Up to 5 oz. per head per day should be quite safe.

Phosphate and Cobalt (')

In coastal areas add 1 oz. of cobalt chloride or cobalt sulphate to 100 lb. of lick as prepared in phosphatic licks 1 and 2 above.

Phosphate, Cobalt and Copper

100 lb. ground rock phosphate;  
50 lb. Denmark lick.

Maximum per cow per day is 4½ oz. This is a convenient method of adding cobalt, copper and common salt to a phosphate lick.
Cobalt (‘)
This may be administered by top-dressing of pastures at the rate of 4 oz. of cobalt chloride or cobalt sulphate per acre and is probably effective for two years.
The cobalt bullet has been developed recently and is also useful.
DENMARK LICK may be used at the following rates:
- Cattle 2 years and over 2 oz. per day.
- Yearlings 1 oz. per day.
- Calves ½-1 oz. per day.
Denmark lick will also supply the copper requirements.
Cobalt-salt lick may be compounded by mixing 2 oz. cobalt chloride or cobalt sulphate with 100 lb. of salt and feeding as suggested for Denmark lick above.

Copper (‘)
This element can be supplied by top-dressing pastures at the rate of 5 lb. blue-stone (copper sulphate) per acre at about three-year intervals.
Copper may also be supplied by the use of Denmark Lick, fed at the same rate as above.

REFERENCES
4. Copper and Cobalt Deficiency of Livestock in Western Australia, West Australian Department of Agriculture Bulletin 2682.

OTHER FOODSTUFFS
If a farmer wishes to use a foodstuff not referred to in the rations above, the Department of Agriculture can work out a ration for him if he provides details of—
1. the cost;
2. the other constituents with which he requires it to be mixed;
3. the production of the cows to which it is to be fed;
4. an estimate of the value of paddock feed at that particular time of the year.

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