



## FEEDING DAIRY CATTLE

The fundamental principles in the making of a successful ration for dairy cattle depend upon the nutritive quality, digestibility, palatability, variety, succulence and economy of the feeds composing the ration. When raising or purchasing foodstuffs for economic milk production all of these essentials of a well balanced ration must be considered.

Early luscious spring pastures provide ideal conditions for milk production and are conducive to a heavy milk flow obtained at very low cost. The aim should be to duplicate these conditions as closely as possible throughout the year. Experience shows that fall-calving cows generally produce more milk than spring-calving cows, but winter-produced milk costs considerably more in feed and labour. If winter milk production is contemplated, special attention should be given to supplies of suitable home-grown feeds, sufficiency and efficiency of labour, and adequacy of price return.

Under wartime conditions the quantity, quality and economy of production become increasingly important. It is essential, therefore, that the dairy farmer study his conditions closely and do everything possible to meet the existing situation. Proteins from both animal and vegetable sources are scarce and such supplies as there are must be reserved for those classes of stock that need them most. Dairy cows require proteins in fairly large proportions in their rations but fortunately these proteins can be supplied to and utilized by the dairy cow to quite a large extent through leguminous roughages. These sources should be made use of to the greatest extent possible.

The recommendations in this publication for protein levels in the grain rations for dairy cows are based on normal times. In view of the scarcity of proteins it may be necessary to lower the recommended protein levels considerably. When a range in protein level is given the minimum may be taken as a wartime standard and the maximum as the normal maximum standard. While lowering the protein level will tend to lower production somewhat, the deficiency in both protein and production can be made up in part at least by feeding larger quantities of the leaner grain mixtures. Ample supplies of western coarse grains and mill feeds at controlled prices and government freight assistance makes such a shift possible and economical.

## FEEDING CALVES

Remove the dairy calf from the cow at or shortly after birth. The mother's first milk or colostrum should be fed for the first four days, at the rate of 5 to 10 pounds daily, divided into two or three feeds. Feed whole milk for the first



3 weeks, then start replacing part of it with skim-milk, so that when the calf is 6 weeks of age it may be receiving, in two feeds daily, 12 pounds of skim-milk. A satisfactory guide for the amount of milk to feed is to give 1 pound for each 10 pounds of live weight. Feeding should be carried out regularly and milk should be fed at a uniform temperature from pails always kept clean.

As the change from whole milk to skim-milk is made, introduce gradually a calf meal made as follows: ground flaxseed, 1 part, or oilcake meal, 2 parts; finely ground oats (preferably hullless or with hulls sifted out), 2 parts; ground corn, barley, or wheat, or a mixture of all three, 2 parts. Prepare by stirring necessary meal into scalding water, avoiding lumpiness. Feed in the warm skim-milk, divided into two feeds daily, at the rate of  $\frac{1}{8}$  pound at the start and increase to one pound at five months. This calf meal may be fed dry in the pail after the skim-milk, if preferred. If skim-milk is not available, continue whole milk feeding longer, gradually replacing with water and calf meal.

At three weeks of age, feed a small quantity of whole oats in the manger. Fine alfalfa or clover hay and clean water might profitably be kept before them from this time on.

Replace the whole oats at four weeks of age with a grain mixture of equal parts bran, rolled oats, and ground barley. Start the calves on  $\frac{1}{8}$ -pound per day and increase gradually to 1 $\frac{1}{2}$ -pounds daily at twenty weeks of age, when the skim-milk and calf meal may be gradually cut off and this grain ration increased proportionately.

**Spring-born** calves should not be exposed to heat and flies, but be kept in a cool box stall until three or four months of age, after which they may have a night paddock. Later in the season, late August or early September, when the calves are fairly well grown, they should have access to a good aftermath pasture during the day in order that they may be fortified with vitamins A and D previous to going into winter quarters. Exposure to direct sunlight is necessary for the purpose of building up vitamin D. White scours is a common ailment of spring-born calves. For methods of control and treatment, see Special Pamphlet No. 35, "White Scours in Calves".

**Fall-dropped calves** should be kept in a clean, bright, comfortable box stall. Feed a limited amount of roots or ensilage. Good quality sun-cured green alfalfa or clover hay is particularly valuable at this time, as a source of vitamins A and D. Ordinarily the foregoing rations will prevent rickets in closely-housed calves, as exhibited by enlarged joints, roached back, tucked-in heart girth, etc., but if the above symptoms are exhibited, then feed the affected animals a little cod liver oil daily. Feed salt in limited quantities regularly and water as required.

## FEEDING HEIFERS

**Fall-born heifers from six to ten months of age** should, during their first summer, be provided with a good pasture. If necessary feed a grain mixture composed of 2 parts of bran, 2 parts of oats, and 1 part of barley. Grain feeding may be particularly advisable for the first few weeks until these fall-born calves get used to the pasture, thus avoiding a serious set-back in growth.

**From ten to twenty months of age** keep the heifers growing as rapidly as possible and in fair flesh. This can be accomplished on good pasture, or with a winter ration of silage or roots with hay, or hay and straw. Feed 15 to 20 pounds of silage, or 20 to 30 pounds roots, and 8 to 10 pounds of hay, or a combination of hay and straw. If hay is not available, *green* oat feed or oat sheaves are satisfactory. Heifers on the above ration will need little, if any meal. If thought necessary, feed a grain mixture of equal parts of bran, ground oats, and



barley, at the rate of 2 to 3 pounds daily. Breed the heifers at 18 to 21 months of age, depending on size and condition, so that they will freshen at 27 to 30 months of age. From 25 to 28 months of age put the heifers in good flesh for calving. With an increase in the proportion of bran as the animals near calving, these rations will give excellent results.

### FEEDING DAIRY COWS

**The dry cow** receives little attention from the majority of dairy farmers. A thin cow cannot produce a rugged, healthy calf fitted to withstand the many calf ailments, and will not produce milk economically. Allow the cow six to eight weeks' rest before freshening. A pound of meal a day during this dry period to a thin cow is worth as much as 2 to 3 pounds of meal fed after the cow has freshened. On poor pasture, feed the dry cow green feed, silage or roots, and a grain ration composed of two parts of any two of the following: bran, ground oats, ground barley; plus one part oilcake or soybean meal. To the thin cow feed 4 to 7 pounds daily; if the cow is in good flesh, give roughage as needed and 1 to 2 pounds daily of the abovementioned grain mixture; if the cow is fat, withhold grain, but on the other hand, do not sacrifice flesh or lose a thrifty condition.

**At calving time** the cow requires special care, varying with the individuality of the animal. Be sure that the condition of the bowels is normal. Constipation at this time is apt to induce many troubles.

If at all possible, heavy cows with large udders should have the benefit of a large box stall at calving time. Assistance should be given at calving when necessary. If there is any difficulty with mal-presentation of the calf that can not be readily overcome by the attendant, a veterinarian should be called at once as delay makes the case that much more difficult with possible loss of both calf and cow. If an attendant is present at calving time, a calf may be saved that would otherwise die for want of minor attention, such as removal from the accompanying membranes, release from an awkward position in the gutter, or manipulation to promote breathing. The calf may be left with the cow until she licks it off and it gets its first feed of milk or it may be taken away at once as the occasion warrants. However, as already intimated, the importance to the calf of a good feed of the first milk can hardly be over-estimated.

**After calving** give the cow a tepid drink containing a handful or two of linseed oilmeal and bran per pail of water; allow to rest quietly for twelve hours, after which give a warm bran mash, with two mashes on the second day after calving. Feed a limited supply—6 to 8 pounds—of clean legume hay. Draw a little milk three or four times daily for the first two or three days; do not milk dry until after the third day, as such a procedure frequently brings on milk fever. On the fourth day start the dry meal ration, consisting of 4 pounds equal parts bran and ground oats. Increase the amount and the strength of the grain mixture to the full grain ration on or about the tenth day after calving.

### WINTER FEEDING OF DAIRY COWS IN MILK

Properly fed, a fresh-calved cow will invariably produce the cheapest milk. A pound of grain when the cow is fresh is equivalent to several pounds of grain after the cow has decreased materially in her milk flow. In winter feeding for milk production, good hay, roots or silage, or both, a suitable meal mixture, a mineral supplement, salt and water are the materials required for successful results.

**Roughage.**—The best kind of roughage for cattle is good quality alfalfa or clover hay. Mixed hay should contain a large proportion of alfalfa or clover. Timothy hay is decidedly inferior for milk production. The quantity



of the hay is important; it should be cut early, well cured, *green*, bright and clean. One of the simplest rules regarding the quantity of hay to feed is to give all that the cow will clean up readily two or three times a day. More definite guides in feeding roughages are as follows:—

- (a) When neither roots nor silage are available, feed daily from 2 to 2½ pounds of hay for each 100 pounds live weight.
- (b) When both silage and roots are available, feed daily 1 pound of hay, 2 pounds of roots, and 2 pounds of silage for each 100 pounds live weight.
- (c) When roots only are available, feed daily 1½ pounds of hay, and 4 pounds of roots for each 100 pounds of live weight.
- (d) When silage only is available, feed daily 1½ pound of hay, and 2½ pounds of silage for each 100 pounds of live weight.

When hay constitutes the only roughage it should consist of alfalfa, clover or mixed hay if at all possible.

Roots or silage, preferably both, should be provided for winter feeding. In addition to their food value, these feeds are valued for their beneficial effect on the digestive system. Roots are usually pulped for feeding, but may be fed whole, amongst the hay in the manger.

**Meal mixtures** or concentrates, for dairy cows, require careful study. There are several factors that should be considered:—

- (a) The meal mixture should be based on the home-grown feeds available, including the hay and other roughages, as well as the home-grown grains.
- (b) The protein content of the meal mixture is important. As a general rule, for commercial herds the meal mixture should contain 14 to 16 per cent total protein, when alfalfa or clover hay, or mixed hay with a large proportion of clover or alfalfa, is available. For cows on test, or where the hay is of poor quality, a total protein content of 16 to 18 per cent in the meal mixture should be fed.
- (c) The cost of the meal mixture should be very carefully considered. Costs may be reduced by the production and use of home-grown roughages, grains and protein supplements of the right kind and quality, and also by giving consideration when buying feeds to the relative cost and the availability of the various feeds on the market.
- (d) The palatability of feeds is another point to be kept in mind. Cows will eat larger quantities of feeds that are relished, and consequently will produce more milk.
- (e) The suitability of the various feeds for dairy cattle requires consideration. For example, cottonseed meal is rich in protein, but, because of its constipating effect, should be used in conjunction with laxative feeds, such as roots or silage.
- (f) A variety of feeds in the ration is recommended. This does not mean a change of feeds from day to day; in fact, sudden changes are to be avoided. Variety is provided by a combination of a number of different feeds to form the daily ration. The cow is more likely to secure all the materials required for body maintenance and for milk production from a number of feeds in combination.

A great many different meal mixtures are used for cows in milk. During the past several years, advisory feed boards, or committees, have been formed in the several provinces, and publications have been issued in which rations for the various classes of stock are suggested or recommended. In each of these publications the suggested meal mixtures and rations are, of course, based upon the cropping practices, the availability of feed stuffs, and the general



conditions applying to the provinces concerned. Dairymen are urged to secure in their respective provinces copies of provincial publications dealing with this subject. As a general rule the meal mixture should consist of approximately 60 per cent carbohydrate grains, preferably home-grown, to 40 per cent protein rich concentrates. An example of a simple meal mixture for use with legume hay is as follows: ground oats, 3 parts; ground barley, 2 parts; bran, 2 parts, and oilcake meal, 1 part—yielding approximately 16 per cent total protein. Other suggested meal mixtures for milking cows are as follows:—

**A. With good alfalfa and red clover hay, with or without silage or roots:—**

Ground oats or rolled oats.....	300 lb.
Ground barley OR ground corn OR rolled wheat OR hominy feed OR any combination of these feeds.....	200 lb.
Bran OR equal parts of bran and shorts OR equal parts of brewers' grains and bran OR equal parts of corn gluten feed and bran....	200 lb.
Linseed oilmeal OR soybean oilmeal OR cottonseed meal OR ground soybeans OR any combination of these feeds.....	100 lb.
Total .....	800 lb.

Approximate total protein 16 per cent.

In the above and following mixture special emphasis can be laid, under wartime conditions, on the use of home-grown soybeans to supply the protein.

**B. With mixed hay (chiefly grasses) or timothy hay, with or without silage or roots, feed the following mixture:—**

Ground oats or rolled oats.....	300 lb.
Ground barley OR ground corn OR rolled wheat OR hominy feed OR any combination of these feeds.....	400 lb.
Wheat bran OR equal parts bran and shorts OR equal parts brewers' grains and bran OR equal parts gluten feed and bran.....	200 lb.
Linseed oilmeal OR cottonseed meal OR soybean oilmeal OR soybeans OR any combination of these feeds.....	200 lb.
Total .....	1,100 lb.

Approximate total protein 18 per cent.

Where commercial protein supplements are used to make up grain rations mixing 600 lb. of home-grown coarse grains with 300 lb. of 24 per cent protein supplement will give a mixture containing approximately 16 per cent protein; 600 lb. to 200 lb. will give a mixture containing approximately 15 per cent protein, which is about the maximum that should be included under wartime conditions. If 30 per cent protein supplement is used, then a mixture of 600 lb. coarse grains and 150 lb. of the 30 per cent protein supplement will give close to a 16 per cent protein mixture. A mix of 600 lb. coarse grains and 100 lb. of 30 per cent protein concentrate will give close to a 15 per cent protein feeding mixture. When feeding these commercial protein supplements, there is not the same necessity for feeding supplementary minerals such as bonemeal since the concentrates are usually fortified with minerals. However, it would still be well to include some salt in the mixture.

The meal mixture is the most expensive part of the ration and it should be fed in accordance with the milk production of each cow. There are two rules that may be used:—

- (a) Feed 1 pound of the meal mixture to every 3 or 4 pounds of milk produced daily. Cows giving milk rich in butterfat require more meal in proportion to the pounds of milk than cows giving milk of lower butterfat percentage.
- (b) Feed 1 pound of meal daily for every pound of butterfat produced in a week. For example, a cow producing 10 pounds of butterfat in a week should receive 10 pounds of meal per day.

**Mineral Supplements.**—Salt should always be provided. Cows require from 1 to 2 ounces of salt per day. It may be fed in the meal mixture by adding 1 pound of salt to each 100 pounds of meal, or it may be fed separately.



Heavy-producing dairy cows use up a lot of minerals, particularly calcium (lime) and phosphorus. When on good, well-fertilized pasture, supplementary minerals are not usually necessary. However, heavy milking cows on winter rations may benefit by the feeding of supplementary minerals. A simple method of supplying the necessary minerals is to add two pounds of bonemeal or the same amount of a suitable commercial mineral supplement to each 100 pounds of the meal mixture.

In districts where it is known that there is a deficiency of iodine, this mineral should be supplied to prevent goitre. Iodine may be supplied in the form of iodized salt.

**Water.**—A liberal supply of good, clean water should be provided for all cattle, and particularly for producing cows.

### SUMMER FEEDING OF DAIRY COWS IN MILK

In the summer feeding of cows, good pastures are of paramount importance. Allow the cattle on pastures when the grass is four to six inches in height, and endeavour to avoid under- or over-grazing. The regular pasture, whether on rough land or in the farm rotation, may be supplemented during the dry summer months by providing hay aftermath, annual pastures, soiling crops, silage, or grain as available. On abundant pasture cows giving 30 to 35 pounds of milk daily will not need grain. With heavier production, or when pastures are getting low, grain should be fed. The grain ration may consist of equal parts oats and barley fed at the rate of 1 pound for every 4 pounds of milk over 30 pounds produced.

As the season advances and the pastures dry up, thus reducing the percentage of proteins in the grass, it will be found advisable to add some protein concentrate to the above coarse grain mixture.

Silage held over from the previous year's crop or legume silage put up earlier in the same year provides a means of supplementing dried up summer pastures with a minimum of labour and very good results. Some grain may be fed with the silage if needed.

Annual pastures and soiling crops are valuable. An annual pasture is particularly useful from a labour-saving standpoint.\*

### FEEDING THE DAIRY BULL

The thin, weak bull almost invariably produces calves lacking in vitality; the over-fat bull is often an uncertain breeder and may also produce weak calves. Keeping the bull in medium condition and well-exercised is an insurance toward the production of large, vigorous calves. The bull should not be allowed to run at large, but should be kept in a well-fenced corral with safety breeding chute adjoining the box stall. Grass in this corral ensures cheap feeding and proper maintenance. In the absence of pasture, feed good quality hay, *green feeds*, or roots, or roots and ensilage mixed. Feed grain only as needed. A mixture of equal parts crushed oats and barley with a little oilcake meal is excellent. Stepping up the protein proportion of the ration with a fortified feed, such as chick starter, is sometime a means of pepping up a slow bull.

### RULES IN FEEDING

Never overfeed. Feed according to the individual needs and desires of each animal. Feed regularly both as to the hours of feeding and the character of feeds. Sudden changes in feeds will cause not only a loss in gains or production, but will often induce ailments. Prevention is simpler and cheaper than cure.

\* See Special Pamphlet No. 15, Pasture Improvement for Cheaper Production and Farmers' Bulletin 51, Pasture Improvement in Eastern Canada.



AVERAGE COMPOSITION OF SOME DAIRY CATTLE FEEDS (1)

	Total Protein	Fat	Fibre	Total Digestible Nutrients	Mineral Matter
	%	%	%	%	%
<i>Concentrates—Grains—</i>					
Barley.....	11.8	2.0	5.7	78.7	2.9
Buckwheat.....	11.9	2.4	10.3	64.4	2.0
Corn.....	9.7	4.0	2.3	83.7	1.4
Flaxseed.....	23.5	36.4	5.9	108.7	3.6
Oats.....	12.0	4.7	10.6	71.5	3.6
Rye.....	12.3	1.7	2.3	80.1	2.0
Soybeans.....	36.9	17.2	4.5	86.2	5.3
Wheat.....	13.1	1.7	3.0	83.6	2.0
<i>Concentrates—By-products—</i>					
Bran.....	15.8	5.0	9.5	70.2	6.0
Shorts.....	17.8	4.7	6.2	76.3	4.4
Middlings.....	17.0	4.9	4.4	79.5	3.4
Dist. Dr. Grains (Corn).....	30.6	10.6	10.8	85.0	2.9
Dist. Dr. Grains (Rye).....	18.1	6.9	17.0	62.9	3.2
(2) Dist. Dr. Grains (Wheat).....	27.6	7.1	15.7	.....	3.7
Br. Dr. Grains.....	25.6	6.7	14.8	.....	3.7
Malt sprouts.....	26.4	1.5	12.7	65.3	6.1
Gluten feed.....	26.4	2.5	7.1	70.6	6.1
Linseed oilmeal (O.P.).....	35.2	6.3	8.0	77.4	5.5
Soybean oilmeal (Sol. P.).....	46.4	1.6	5.9	78.2	6.0
Cottonseed meal.....	43.2	7.2	10.6	77.6	5.5
Fish meal.....	58.7	7.9	0.9	74.9	20.7
Tankage.....	50.3	11.3	2.0	67.6	25.9
Molasses.....	2.8	.....	.....	71.5	9.4
<i>Roughages—</i>					
Alfalfa hay.....	14.7	2.0	29.0	50.3	8.3
Clover hay (red).....	11.8	2.6	27.3	51.9	6.4
Mixed hay.....	9.6	2.7	28.8	50.5	6.2
Timothy hay.....	6.2	2.4	30.1	46.9	5.0
Straw (oat).....	4.0	2.3	36.1	44.1	6.0
Corn silage.....	2.3	0.9	6.9	18.7	1.7
Alfalfa silage.....	10.0	2.5	14.2	29.0	5.3
Mangels.....	1.4	0.1	0.8	7.3	1.0

(1) Unless otherwise noted taken by special permission of the Morrison Publishing Co., Ithaca, New York, from *Feeds and Feeding*, 20th edition, by F. B. Morrison

(2) Data on wheat distillers' grains from C.E.F. records.

## COMMON DAIRY CATTLE AILMENTS

The dairy cow is a highly specialized individual. The nervous, physical and bodily strain of assimilating large quantities of concentrated food and coarse fodders, together with the manufacture of milk, is so great that special emphasis must be laid on prevention of disease by proper methods of feeding and management. It is important to realize that the management and treatment of diseased conditions require knowledge, experience, and balanced judgment. Consequently, the services of a qualified veterinarian should be obtained for the treatment of any serious animal ailment whenever this is possible. Where a veterinarian is not available, however, the following advice will be of value.

**Diarrhoea.**—Caused by overfeeding, indigestible, sour or decomposed food; with calves, results from sour or too cold milk, overfeeding, unclean pails, etc.

**Treatment.**—In early stages adults should receive 12 ounces raw linseed oil with 1 ounce laudanum and 20 drops creosote. Give small quantities of easily digested food and plenty of water. Calves, 1 to 2 ounces of castor oil, depending upon the size of calf. Dilute milk with lime water. Feed milk several times daily in small quantities. Skim-milk calves should receive 4 drops formalin or Lugol's solution per quart of milk, added just before feeding. Keep clean and warm.

**Impaction (Third Stomach).**—Caused by long-continued feeding with coarse, unnutritious, fibrous fodder; insufficient salt and water.



**Symptoms.**—Loss of and irregular appetite; dry nose, staring coat; diarrhoea followed by marked constipation.

**Treatment.**—Purge with 1 pound Epsom salt, 4 drams aloes, 1 ounce ginger, in 2 quarts of warm water. Follow with 1 quart linseed gruel every eight hours. Water as desired. Feed small warm bran mashes. Rectal injection may assist. Feed lightly on improvement.

**Bloat (Tympanitis).**—Results from sudden changes from dry to green feed, as clover, alfalfa, turnip tops, rape, etc., overfeeding on any of above fodders when wet or frozen; poor condition. Some animals are more subject to bloat than others.

**Symptoms.**—Distention of rumen with gas, greater to left side. Animal grunts and moans, lies down and rises frequently.

**Treatment.**—Depends on condition or stage. If light attack, give 1 pint linseed oil, mineral oil, or coal oil in milk; oil of turpentine, 2 to 4 ounces in quart of milk; ginger, 1 to 2 ounces. If severe bloating is shown, tap with trocar and canula, half-way between last rib and hook bone on left side. If imperative, use a knife. After gas escapes, give 1 pound Epsom salts, 1 tablespoonful ginger, 1 quart warm water. Feed small quantities food for a few days.

**Milk Fever.**—Caused by depletion of calcium in blood brought on at time of calving and start of milk flow, usually brought about by milking animal dry shortly after or within three days of calving. Heavy producers usually affected.

**Symptoms.**—May appear from shortly after calving until the fifth or sixth day. Animal appears excited and restless with quickened breathing. Later becomes unsteady on feet, swaying. Falls and rises until finally is unable to regain feet. Eyes staring, head swings to one side.

**Treatment.**—Must be prompt. Call veterinarian to give calcium-gluconate treatment intravenously, or milk dry, fill quarters with air preferably from a regular milk fever outfit. In emergency, use an ordinary bicycle pump, rubber tubing and milk tube. First, carefully disinfect teats with iodine and sterilize tube in boiling water. Then inflate udder. Tie ends of teats with tape. Repeat if air escapes. Treatment should take effect in less than an hour. Feed lightly for a few days thereafter. Do not drench a cow affected with milk fever until she has recovered from the more immediate effects; choking and death may follow.

**Retention of the After-Birth.**—May be caused by inflammation of the placental tissues due to intra-uterine infection with pathogenic bacteria; or deficiency of certain essentials in the ration such as vitamin A.

**Treatment.**—If animal is healthy and weather fairly cool wait for 48 hours, then apply gentle traction. If this fails wash the arm in 5 per cent creolin solution and insert into uterus a one-ounce gelatin capsule filled with iodoform. If after-birth still does not come away at end of 36 hours insert another capsule containing half iodoform and half boracic acid. Continue this treatment every 48 hours until after-birth comes away, usually in about 8 to 10 days. Then douche the vagina and uterus thoroughly with warm normal salt solution (1 ounce salt to 1 gallon water) every day until cleaned up.

**Mastitis (Inflammation of the Udder, Caked Udder, Garget).**—Caused by germ infection usually following injuries, infrequent milking, draughts, cold, wet floors, and too heavy feeding previous to and after calving.

**Symptoms (Acute type)**—One or all quarters swollen and inflamed; milk flakey, thick or curdled and watery; secretion reduced.

**Chronic type.**—Gradual infection of udder, with occasional swelling; gradual destruction of milk-secreting tissue and diminished milk flow.

**Treatment and Control.**—See War-Time Production Series Special Pamphlet No. 31, "Mastitis and Milk Production".