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Dairy Cattle Feeding with Some Pointers on Management

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Dairy Cattle Feeding with Some Pointers on Management

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Success in dairying largely depends on three things:

Good cows that are healthy.

Good feeding with cheaply produced or reasonably priced feeds.

Good common-sense management.

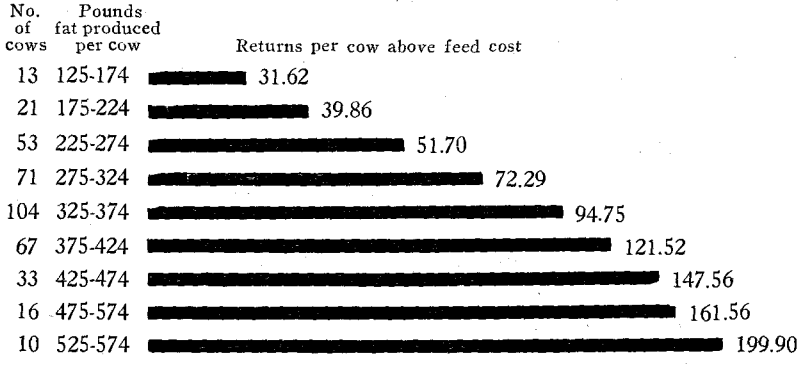
Dairying so-called may be carried on without one or more of these factors, but real success is impossible without careful consideration of each one, and the greater the neglect to any one or all the quicker the failure.

GOOD COWS

Only good cows are recommended but in cases where experience is desired or there is an extreme shortage of funds, it may seem necessary to start with poor producing animals. With cows of this type, and a good pure-bred sire a good herd can be built up, but real profits should not be expected too soon. In a cost-of-production study in the Willamette Valley it was found that the production per cow affected costs more than did any other one thing. It was also found that cows must produce at least 240 pounds of butter-fat annually if they pay a profit. Many dairymen believe the point at which profits begin is 300 pounds of fat per year. Results from one of the testing associations here charted further indicates the value of high production per cow.

CHART I

Relation of Fat Production per Cow to Returns above Feed Cost
An Oregon Cow Testing Association—388 Cows



In cost studies previously mentioned it was found that labor costs and overhead charges, such as taxes, interest, repairs, etc., would amount to more than the returns above feed cost indicated in the first three

groups of cows in this chart. It would therefore require cows of a production equal to those of the fourth group before profits could be assured. Failure to get satisfactory production with grade cows should not induce one to buy pure-bred ones in the hope of getting higher production, but should usually be considered as evidence that more money should be expended in the purchase of a carefully selected pure-bred sire.

Healthy cows necessary. If high production is continued the cows must be healthy. Although little tuberculosis now remains in the state, a dairyman cannot afford to discontinue testing. Of more importance is it to know whether abortion disease is present, as more loss in production is occasioned by abortion than by any other disease. All dairy herds should be tested for this disease, and testing should be continued as for tuberculosis.

Set a production standard. A definite production standard of 350 to 400 pounds should be set as a goal by every dairyman. When this is reached the standard may be set at a higher mark. Dairying is in no sense a "get-rich-quick" proposition. Margins of profit are not large but, with attention to the necessary details, these margins are sure.

GOOD FEEDING

Dairying can go no further than feed conditions will permit. Even with good healthy cows success is not assured, unless these cows are properly fed. To be well fed the dairy cows must have:

(1) An abundance of feed.
(2) A succulent feed.
(3) A properly balanced feed.
(4) A palatable feed.

Profit in feeding is dependent upon keeping a high-producing cow as nearly as possible, health considered, to her maximum production at all times. Abnormal decreases in production often are not regained and if regained, are at increased cost. High production, which as pointed out is cheaper production, is not attained on half rations but requires a full ration or a feed abundance. Since the old original cow that needed only pasture in the summer and dried grass in the winter, the cow's stomach has not increased in size in the same proportion as has her ability to produce milk and butter-fat. Consequently to get this higher production requires the use of concentrated feeds, which have more feed value per pound than does hay or pasture grass.

The point of profitable production is so high under present competitive conditions that it is an exceptional herd with an exceptional owner who has an exceptionally good pasture and makes exceptionally good hay, if it returns an appreciable profit without the feeding of grain.

In a few cases profits are being made under these conditions in different parts of the state, but they are the exception rather than the rule. An average sized cow producing a pound of butter-fat per day will use for her body needs approximately one-half the ration she requires. These body needs are practically the same if she produces twice this amount. A half feed in the first case will prevent production, while in the second, production will be cut in half.

Some general rules may aid in determining amounts to feed.

1. In winter feed all the roughage, such as hay and silage or roots, that the cows will clean up.

2. In irrigated alfalfa districts, feed grain to cows producing more than 18 to 25 pounds of milk daily, depending on whether it is high or low testing. For production above these amounts feed 1 pound of grain to 2½ to 3 pounds of high testing milk, or 1 pound to 3 to 3½ pounds of low testing milk.

In the Willamette Valley and on the Coast, feed grain to cows producing more than 10 to 15 pounds of milk at the rates above mentioned.

3. For summer feeding when on good pasture, grain is not used until a production of 5 to 10 pounds greater is reached; then feed one-half as much grain as above recommended.

Amounts profitably fed will vary with different cows. They are individuals with different tastes, and general rules cannot fit all animals or all herds. Every dairyman must know his cows, and know their production if feeding is to be profitably done.

The chart below will show the need of a full feed with high producing cows.

CHART 2

Daily Feed Requirements of a 1000-pound Cow Producing Two Pounds of Butter-fat per Day

Feed requirements for body maintenance	Additional feed requirements in producing 2 lbs. butter-fat							
	¼	½	¾	1	1¼	1½	1¾	2

Approximate Daily Feed Amounts That Will Meet These Requirements

1.	50 lbs. Good hay.	
2.	23 lbs. Good hay and	13 to 16 lbs. grain.
3.	12 lbs. Hay, 30 lbs. silage	and 13 to 16 lbs. grain.
4.	30 lbs. Good hay and	10 to 12 lbs. grain.
5.	19 lbs. Hay, 30 lbs. silage and	10 to 12 lbs. grain.
6.	23 lbs. Hay, 20 lbs. silage	and 10 to 12 lbs. grain.

In this illustration if cows could eat the amount of hay indicated in Number 1 there would be no feeding problem; but unfortunately they cannot. On this account grain is fed to maintain the body weight and keep up high production.

If the cow eats 30 pounds of good hay, or 19 pounds of hay and 30 pounds of silage, or 23 pounds of hay and 20 pounds of silage, about 8/10 pound of butter-fat can be produced. If greater production is obtained and continued, grain must be fed since greater amounts of roughage are not ordinarily consumed by 1,000-pound cows. When a greater production than the 8/10 pound is obtained without grain, and with the amounts of roughage indicated, it will be at the expense of reserves the cow has built up in her dry period, and she will gradually go down in flesh and later go down in milk flow. It will also be noticed that the less the amounts of roughage used the greater the amount of grain required. Twelve pounds of hay and 30 pounds of silage is nearer the amount cows in the Willamette Valley will consume, thus making it necessary to feed about 4 to 6 pounds of grain to get one pound of butter-fat per day, and 13 to 16 pounds to get two pounds of butter-fat per day. When greater amounts of roughage are consumed than indicated in numbers 2 to 6 less grain is necessary. The quality of roughage will often determine the profitableness of grain feeding. If the quality is poor it may require so much grain to keep up production as to render the whole operation unprofitable, while with a high quality roughage the smaller portion of grain required will make it highly profitable.

1. **Succulence.** Pasture is the ideal method of furnishing succulence, but unfortunately pasture is not produced in the winter months, and in some sections of the state, good pasture is not produced in the summer months. It will pay real dividends to give greater attention to pastures in all sections of the state, more cultivation, better fertilization, and of especial importance is the rotation from one field to another. By proper management the carrying capacity of many pastures can easily be doubled.

Succulent feeds at other seasons of the year are a real necessity; cows in milk should have succulent feed every day they are not on pasture. Succulent feeds are an aid to digestion, will increase consumption of roughages, and there is evidence that they are aids in making available the minerals in the other feeds. Succulent feeds may be considered a digestive lubricant.

The amount to be fed depends on the cost of producing them and the yields obtained. Where silage yields more than 3 times, and root crops more than 6 or 7 times the tonnage of hay, then high amounts can be profitably fed, as they are cheaper than hay and will replace it in the ration. On the other hand, where less amounts are produced than indicated, hay will be cheaper, hence a high proportion of hay is desired, and lesser amounts of succulents will be used. Less than 12 to 15 pounds daily will not be advisable, however.

2. How to balance the ration. Balancing rations is merely a common-sense proposition. Every dairyman knows that some feeds have the effect of stimulating milk production, while other feeds have the effect of "slickening up" the cows or of keeping them in good condition. Balancing rations is merely combining these two types of feed for maximum results. Those feeds that seem to stimulate milk production contain a high amount of protein, which makes the curd portion of the milk and rebuilds the worn tissues of the body. Common examples of this type

of feed are alfalfa hay, kale, bran, and the concentrated feed meals, such as linseed-meal, soy-bean, and cottonseed-meal. The feeds that put the cow in good condition also provide heat to her body, and put the sugar and fat in the milk. Common feeds of this type are ensilage, roots, and the grains, such as corn and barley.

Some feeds such as clover, or oats-and-vetch hay, and oats, are practically balanced within themselves.

On the Coast and in the Willamette Valley the problem is to provide enough of the protein feeds, while in the alfalfa districts the problem is to provide enough fattening feeds, and also to provide a little variety in the protein. Excessive amounts of protein in a ration usually make it an expensive ration, while excessive amounts of carbohydrates furnished by the fattening feeds prevent high milk production, and may cause the cow to become too fat.

The following list of feeds will enable a dairyman to determine in which class his farm-grown feeds belong, and will help in deciding which feeds to buy.

Feeds in balance	*Carbohydrate feeds*	*Protein feeds*
Clover hay	Timothy hay	Alfalfa hay
Oats-and-vetch hay	Grain hay	Vetch hay
Oats-and-pea silage	Mixed hay	Kale
Turnips	Reed Canary grass hay	Cabbage
Pumpkins	Creeping bent grass hay	Wheat bran
Oats	Corn silage	Wheat middlings
Rye bran	Carrots	Wheat mill-run
	Mangels	Oil meal
	Barley	Cottonseed-meal
	Corn	Soy-bean meal
	Beet pulp	Cocoanut meal
	Molasses	

For the dairyman who wishes to make a closer balance of his ration the following chart is provided. This will show the pounds of different protein feeds required to balance given amounts of carbohydrate feeds, and the reverse is also given. By balancing the ration with this chart and referring to amounts to feed on page 5, very little figuring is necessary in determining the proper ration for the dairy herd.

The Tables follow.

Given amounts of the Main Carbohydrate Feeds with indicated amounts of Protein Feeds required to balance them in a ratio of 1 to 5½.

Given amounts of "Carbohydrate" Feeds	*"Protein" Feeds, any one of which in the amounts indicated will balance the carbohydrates in the other column.*
Corn Silage 10 lbs.	Alfalfa 6 lbs., Kale 20 lbs., Bran 5 lbs., Shorts 6 lbs., Soy-bean ⅔ lb., Mill-run 6 lbs., Oil meal ¾ lb., Cottonseed-meal ⅔ lb., Cocoanut meal 2 1/7 lbs.
Oats silage 10 lbs.	Alfalfa 4½ lbs., Kale 15 lbs., Bran 4 lbs., Shorts 4½ lbs., Soy-bean ½ lb., Mill-run 4½ lbs., Oil meal ⅝ lb., Cottonseed-meal ½ lb., cocoanut meal 1⅝ lbs.

Mangels 10 lbs.	Alfalfa 1¼ lbs., Kale 4 lbs., Bran 1 lb., Shorts 1¼ lbs., Mill-run 1¼ lbs., Oil meal ⅛ lb., Cottonseed-meal ⅛ lb., Soy-bean ⅛ lb., Cocoanut meal ½ lb.
Rutabagas 10 lbs.	Alfalfa 2 lbs., Kale 6 lbs., Bran 1½ lbs., Shorts 1¾ lbs., Soy-bean ⅛ lb., Mill-run 1¾ lbs., Oil meal ¼ lb., Cottonseed-meal ⅛ lb., Cocoanut meal ⅜ lb.
Oats hay 10 lbs.	Kale 35 lbs., Bran 8½ lbs., Mill-run 10 lbs., Shorts 9½ lbs., Oil meal 1½ lbs, cottonseed-meal 1¼ lbs, Soy-bean 1¼ lbs., Cocoanut meal 4 lbs.
Reed Canary grass 10 lbs. or Creeping bent grass 10 lbs.	Alfalfa 14 lbs., Kale 45 lbs., bran 11 lbs., Shorts 13 lbs., Mill-run 13 lbs., Oil meal 2 lbs., Soy-bean 1¾ lbs., Cottonseed-meal 1¾ lbs., Cocoanut meal 4½ lbs.
Oats straw 10 lbs.	Kale 80 lbs., Bran 19 lbs., Shorts 22 lbs., Mill-run 23 lbs., Oil meal 3¼ lbs., Cottonseed-meal 2½ lbs., Soy-bean 2½ lbs., Cocoanut meal 10 lbs.
Barley 1 lb.	Alfalfa 1.2 lbs., Kale 4 lbs., Bran 1 lb., Shorts 1.2 lbs., Mill-run 1.2 lbs., Oil meal 1/6 lb., Cottonseed-meal ⅛ lb., Soy-bean ⅛ lb., Cocoanut meal ½ lb.
Wheat 1 lb.	Alfalfa 1.8 lbs., Kale 6 lbs., Bran 1.6 lbs., Shorts 1.8 lbs., Mill-run 1.8 lbs., Oil meal ¼ lb., Cottonseed-meal ⅛ lb., Soy-bean ⅛ lb., Cocoanut ⅞ lb., Cocoanut meal ⅜ lb.
Corn 1 lb.	Alfalfa 2.1 lbs., Kale 7 lbs., Bran 1.8 lbs., Shorts 2.1 lbs., Mill-run 2.1 lbs., Oil meal .3 lb., Cottonseed meal ¼ lb., Soy-bean ¼ lb., Cocoanut meal 4/5 lb.
Beet pulp 1 lb. ("Molasses")	Alfalfa 2.1 lbs., Kale 7 lbs., Bran 1.8 lbs., Shorts 2 lbs., Mill-run 2.1 lbs., Oil meal .3 lb., Cottonseed-meal ¼ lb., Soy-bean ¼ lb., Cocoanut meal 4/5 lb.
Beet pulp, plain 1 lb.	Alfalfa 2.4 lbs., Kale 8 lbs., Bran 2 lbs., Shorts 2.3 lbs., Mill-run 2.4 lbs., Oil meal ⅛ lb., Cottonseed-meal ¼ lb., Soy-bean ¼ lb., Cocoanut meal 1 lb.
Molasses 1 lb.	Alfalfa 2¾ lbs., Kale 10 lbs., Bran 2½ lbs., Shorts 3 lbs., Mill-run 3 lbs., Oil meal .4 lb., Cottonseed-meal 1/6 lb., Soy-bean 1/6 lb., Cocoanut meal 1¼ lbs.

Given amounts of the Main Protein Feeds with indicated amounts of Carbohydrate Feeds required to balance them in a ratio of 1 to 5½.

Given amounts of "Protein" Feeds.	*"Carbohydrate" Feeds, any one of which in the amount indicated will balance the protein in the other column.*
Alfalfa 10 lbs.	Corn silage 17 lbs., oat silage 23 lbs., mangels 80 lbs., Beet pulp (dried molasses) 5 lbs., Barley 8½ lbs., Wheat 6 lbs., Corn 5 lbs., Molasses 3½ lbs.
Kale 10 lbs.	Corn silage 5 lbs., Oats silage 6½ lbs., Mangels 24 lbs., Beet pulp (dried molasses) 1½ lbs., Oats hay 2¾ lbs., Oats straw 1¼ lbs., Barley 2½ lbs., Corn 1½ lbs., Wheat 1½ lbs., Molasses 1 lb.
Bran 1 lb.	Corn silage 2 lbs., Oats silage 2.6 lbs., Mangels 10 lbs., Beet pulp (dried molasses) .6 lb., Oats hay 1¼ lbs., Oats straw ½ lb., Barley 1 lb., Corn ½ lb., Wheat 1 lb., Molasses 2/5 lb.
Mill-run 1 lb.	Corn silage 1.7 lbs., Oats silage 2.3 lbs., mangels 8 lbs., Beet pulp (dried molasses) ½ lb., Oats hay 1 lb., Oats straw ½ lb., Barley 4/5 lb., Corn ½ lb., Wheat ½ lb., Molasses .3 lb.
Shorts 1 lb.	Corn silage 1.7 lbs., Oats silage 2.3 lbs, Mangels 4 lbs., Beet pulp (dried molasses) ½ lb., Oats hay 1 lb., Oats straw ½ lb., Barley 4/5 lb., Corn ½ lb., Wheat ½ lb., Molasses .3 lb.
Oil meal 1 lb.	Corn silage 12 lbs., Oats silage 15 lbs., Mangels 52 lbs., Beet pulp (dried molasses) 3⅓ lb., Oats hay 7 lbs., Oats straw 3 lbs., Barley 6 lbs., Corn 3⅓ lbs., Wheat 4 lbs., Molasses 2¼ lbs.
Cottonseed-meal 1 lb. or Soy-bean meal 1 lb.	Corn silage 15 lbs., Oats silage 22 lbs., Mangels 80 lbs., Beet pulp (dried molasses) 4½ lbs., Oats hay 9½ lbs., Oats straw 4 lbs., Barley 8 lbs., Corn 4½ lbs., Wheat 5¼ lbs., Molasses 3 lbs.
Cocoanut meal 1 lb.	Corn silage 4 lbs., Oats silage 6 lbs., Mangels 20 lbs., Oats hay 2½ lbs., Oats straw 1 lb., Beet pulp 1 lb., Barley 2 lbs., Corn 1¼ lbs., Wheat 1½ lbs., Molasses ¾ lb.

The following mixtures may also aid in determining what to feed in the districts indicated:

1. Where alfalfa is the only roughage.
   (a) Barley or Corn 400, Oats 100, Bran 100.
   (b) Barley or Corn 400, Bran 100, Oil meal 50.
   (c) Barley or Corn 500, Oats 100, Bran 100, Oil meal or soy-bean 50.

2. Alfalfa with corn silage, or roots.
   (a) Corn or Barley 100, Oats 100, Bran 100.
   (b) Corn or Barley 500, Bran 100, Oil meal 100.
   (c) Corn or Barley 400, Oats 200, Oil meal 100.

3. Clover or oats-and-vetch hay with kale.
   (a) Oats 400, Barley 100, Bran 100.
   (b) Oats 500, Bran 100, Oil meal 100.

4. Clover or Oats-and-vetch hay with silage, or roots.
   (a) Oats 200, Bran 100, Oil meal 100.
   (b) Oats 100, Barley 100, Bran 100, Oil meal 100.
   (c) Oats 200, Barley 100, Oil meal 100.

5. Grain or grass hay with silage or roots.
   (a) Oats 100, Barley 100, Oil meal 200.
   (b) Oats 100, Bran 100, Oil meal 100.

Many different mixtures are possible and other grains may be substituted for those here mentioned. Prices of each will govern substitutions to be made. In many cases a fourth concentrate can be added to advantage and even a greater number is often desirable with high producing cows. When this is done the matter of balance should be kept in mind and an additional amount of the carbohydrate or protein feed already in the ration may be necessary depending on whether a protein or a carbohydrate is added.

Oil meal is the only protein mentioned in these mixtures, but soybean meal or cottonseed-meal may be substituted for all or part of the oil meal, especially where there is succulent feed in the ration. Since both of these contain higher amounts of protein than does oil meal, about 20 percent less of these may be used than of oil meal.

3. **Palatability.** Even if the ration is properly balanced and is fed in proper quantities it may not be readily consumed, and may even be refused by healthy cows. The palatability of the ration should receive consideration under such conditions. Palatability is determined by quality in roughage and concentrates too, at times, and by variety. With proper variety cows may go at their best for a number of months without change of ration. At least two roughages should be fed, hay and a succulent feed, and three grains should be included in the concentrate feed. Very high producing cows can profitably be fed even a greater variety of grains.

Quality of roughage is very important. A very sour silage is not palatable, nor are decayed root crops. Hay which dried too much or has lost its leaves, allowed to get too ripe or rained on, is not palatable. Care in putting up a quality roughage cuts the amount of grain necessary. Grain feeding may therefore be profitable or unprofitable, depending upon the quality of roughage and its palatability.

What minerals should be fed. Investigations indicate that under certain conditions dairy rations may be deficient in salt, iodine, phosphorus, and calcium.

Cows in milk require at least one ounce of salt daily and if high producers, more is required. It may be given in the feed or placed where accessible.

Iodine is required only in sections where goitre is prevalent among calves. As a preventive, iodine in the form of potassium iodide is given. A solution is made of the potassium iodide at the rate of 15 grains of

the crystals to one ounce of water. One ounce of this solution is placed on the grain once a week during gestation.

Phosphorus and calcium may be needed in addition to that contained in natural feeds, especially with high producing cows. With low producing or ordinary cows additional phosphorus may not be needed, since legume hays, grains, wheat bran, and shorts, and high protein concentrates contain relatively high amounts of this element. This is especially true if legume roughage, together with wheat bran or shorts, is a part of the ration prior to freshening.

Calcium (lime) is often more deficient than phosphorus, but may not be required in additional amounts if the roughages used consist of alfalfa, clover, or vetch. With the use of grain hays and grasses of the non-legumes, and especially where these are grown on acid soils, additional calcium may prove advantageous. Mineral deficiency may also exist where cows chew bones and sticks or where weakened calves are dropped, and in some cases where cows cannot be maintained in good flesh.

Apparently the minerals here named are the only ones that may be deficient. Calcium and phosphorus may be supplied in steamed or sterilized bone flour or meal, or by spent bone black, as both are well assimilated and reasonably priced.

These minerals may be fed by mixing two pounds of either with 100 pounds of grain, and thus fed with the grain, or placed where accessible, or they may be mixed with equal parts of salt and animals allowed free access to it.

The importance of pasture, green roughage, and well-cured legume hay in the keeping up of mineral supply cannot be over-emphasized, and the value of a rest period of six to eight weeks, when the cows are liberally fed and put in good condition before freshening, should not be overlooked.

SOME DETAILS IN DAIRY CATTLE MANAGEMENT

KEEPING RECORDS OF PRODUCTION

If a herd of high producing cows is to be built up, some system of record keeping on individuals is essential. In small herds, the taking of samples one day each month is not a great task and testing may be done by the local creamery or it may be done on the farm. For larger herds, however, it will usually pay to become a member of regular cow testing associations and thus have records made by disinterested persons. The appearance of cows is often deceiving. In every cow testing association in the state dairymen have had many surprises as these regular tests showed what their cows actually produced. If it is not desired to check up on the performance of the herd, it may be advisable to become a member of the association to check up on the owner.

SELECTING THE HERD SIRE

The day has long since passed when dairymen can expect to build up high producing herds with grade or scrub sires. Good pure-bred sires are now selling at such a reasonable price that there is no excuse

for not having them. The dairyman should pay greater attention to the productive ability of the family from which this sire comes and not be content with merely a registered animal. More consideration should also be given to the herd sire of a neighboring dairyman that has been used for three or four years in this neighbor's herd and is now to be disposed of. If he has daughters of promise or daughters that are making good accounts of themselves, this mature sire should be purchased regardless of whether or not he is of mean disposition.

REGULARITY OF CARE

Regularity of care in feeding and milking is essential for best results and if greatest profits are to be obtained. It is desirable that milking be done at the same hour each day and that the feeding practice be carried on in the regular manner. Some cows are, of course, more sensitive than others. In the case of more sensitive ones often merely a change of milker or other help in the barn will have its effect on their milk production for that milking.

WATER

While the providing of water might also be considered a part of the dairy cow's feed, yet there is an element of management in providing it. Good high producing cows will use as much as a hundred pounds of water daily and some will use even more. If cows are to be kept in barns in the winter for long periods at a time, it has been found to be of advantage to have drinking cups. On the other hand, if there are shelter sheds a trough will work satisfactorily. In the colder sections of the state, it will be of advantage to warm the water if it is colder than fifty degrees. If the water is cold the cow will not drink as much as she should, and at the same time body heat will be required to warm it, necessitating an increased amount of feed. There are many cheap systems of warming water. Warming water in very cold weather will pay many times over in increased returns.

SHELTER SHEDS

More shelter sheds in all sections of the state are coming into use. These are usually closed on the three sides from which prevailing winds come, leaving one side open where the cows may go in and out as they desire. Some dairymen provide hay feeding in the sheds, putting racks around the closed sides. Some dairymen even so arrange these racks that the hay may be put in from the outside. Dairymen using them say that in such sheds the cows rest better, keep cleaner, and produce more milk. About 75 square feet are usually allowed for each animal. Since with the use of such sheds a cheaply constructed milking shed in addition is all that is required, enough may be saved in barn construction to pay for this additional building.

DEHORNING

If shelter sheds are used it will be especially desirable to dehorn the cows, as they will then require less space and less injury will result. In any commercial herd, in fact, it is desirable to have the cows de-

horned. They will be more quiet and thus more contented and injuries will be considerably less.

REST PERIOD

The production of milk for a year is considerable of a strain for a high producing cow. Consequently, she should be allowed to rest six weeks to two months in order to gain back lost vitality and at the same time to store up energy and minerals for the next period of lactation. Most cows can be easily dried if they are cut down in their feed allowance, especially of those feeds which are milk producers. Milking just once daily for two or three days, then skipping of milkings, will so lessen production to the point that milking out may be discontinued without danger.

MILKING MACHINES

With increased cost of labor and the difficulty of getting the proper kind of milkers, the milking machine is coming into greater general use. In all sections of the state there is an increased demand for installation of these machines, and in many cases the only limiting factor which prevents, or makes inadvisable their use, is the smallness of the herd. In commercial dairies of twenty cows or more, the milking machine is bound to be a paying proposition, while even on some of the smaller dairy farms with twelve to fourteen cows and where there is only one person to do the milking and farm work, a machine may be of advantage, this and the other dairy utensils being washed by the kitchen help.

The machines are not entirely fool proof. They must have some supervision. Machines do not milk cows entirely dry. This, however, is fortunate, since abnormal udder conditions might otherwise not be detected.

SIZE OF HERD

With increased competitive conditions it is becoming more doubtful if the small side-issue dairy farm can be successful, or a paying proposition. This is more of an age of specialization, and in order to take advantage of the latest inventions in labor-saving machinery, the herd unit must be of sufficient size to get the highest possible returns from its use. While diversification on most farms is of distinct advantage, yet each unit of that diversified farm must be of sufficient size to take advantage of machinery adapted to its particular use. It begins to appear that the dairy unit should either be of a size sufficient to supply the home need, or else considerably larger; for instance, from twenty cows up. Probably the six- and seven-cow units are uneconomical and even the ten- and twelve-cow units are becoming questionable.

ROUGHAGES FOR DAIRY COWS

Legume hays. *Alfalfa.* When properly cured with the leaves retained and with a good green color, alfalfa easily ranks first among hays for dairy cattle. It has a high protein content, is very palatable, and is laxative in its effect. It is also high in lime or calcium content, which is desirable for high milk production.

Clover. Red and alsike clover hays are not quite so high in protein as is alfalfa, but their total feed value is almost equal to alfalfa. The clover should also be well taken care of, and should not be allowed to lie in the swath or in the windrow any longer than is necessary for safe storage, nor should it be allowed to be rained on if sufficiently dried to be stacked or put in the barn.

Oats-and-vetch hay. Oats-and-vetch hay is grown largely in the Willamette Valley and when properly cured many dairymen prefer it to clover hay. It has about the same protein content as do clover hays, but is not so high as is alfalfa. It should not be allowed to get too ripe before cutting and even greater care is necessary in curing if a high quality hay is produced.

Oats-and-pea hay. There is not much oats-and-pea hay grown in Oregon, as aphis usually destroys the peas. It ranks a little higher in protein than oats-and-vetch, and has practically the same feed value.

Non-legume hays. *Oats hay.* If a legume hay cannot be grown the oats hay will be the most satisfactory substitute. It should be cut when the grain is in the milk or early dough. It is just a little less in total feed value than the legume hays, but its lack of protein is the main reason it is not so good. Its use will mean that the ration will have to contain a larger amount of protein supplied by wheat by-products or some of the concentrated meals.

Rye hay and wheat hay. These hays should not be used if legumes or oats hay can be produced. Nor should they form any proportion of the ration if the other hays are at all obtainable. They may be used if the other feeds cannot be obtained, but are not as high in feed value nor are they as palatable as the other hays named. As with oats hay, their use will necessitate using more protein in the grain ration.

Canary grass and creeping bent grass hays. These hays are being used more in coast sections. If cut fairly green, especially the Canary grass, they make a fairly palatable hay. These hays are quite similar in feed value to prairie grass hays of other sections. They are low in protein. If allowed to become too ripe, sprinkling with molasses may be advisable to get desirable amounts consumed.

Succulent feeds. *Corn silage.* Corn silage is considered the best silage for dairy cattle feeding. It is the most palatable and the easiest silage to produce in a good quality. In some sections, however, the yields obtained are lower than for any other silage crop, thus bringing the cost per ton above seven dollars. A legume hay, of course, should be fed with corn silage so as to balance the high amount of carbohydrate the former contains.

Oats and vetch silage. In the Willamette Valley oats-and-vetch silage is the most satisfactory substitute for corn silage. Oregon Agricultural Experiment Station tests show that it is practically of equal value. Thus if higher yields are obtained of this material it is more satisfactory to grow than is the corn silage. One disadvantage is that its ensiling comes at a busy time of the year. It is therefore of advantage if a num-

ber of dairymen who are neighbors will go together on filling their silos. Yields are high and costs are about $4.50 a ton in the silo.

Sunflower silage. Sunflower silage compares favorably with corn as far as feeding value is concerned, but it is less palatable and some cows do not learn to eat it. It is especially valuable in sections of high altitudes where other silage crops do not yield well.

Legume silage. Legumes such as alfalfa and the clovers do not ensile as well as the previous crops mentioned, and because of their high protein content it is of more value to have them as hay than as silage. If weather conditions do not permit of making hay, however, silage may be made. Either should be well wilted before ensiling.

Root crops and other succulents. *Mangels.* Mangels are probably used more than any other of the root crops. They are very palatable and the yield is high. They are especially valuable with herds of small size that cannot afford a silo or in sections where a silo is not advisable. Like all other root crops the moisture content is high; consequently it takes about two and one-half pounds of roots to equal a pound of corn silage.

Rutabagas. In the Coast sections rutabagas are a profitable root crop to grow. They have practically the same feed value as the mangels and are almost as palatable. In other sections of the state they are not as commonly grown because the yield is not as high as with mangels.

Turnips. Turnips have the same feed value as do mangels, and are grown more commonly in the Coast sections, where better yields are obtained. In some areas there is a slight tendency to taint the milk when fed in large quantities. It is, therefore, desirable to feed after milking.

Sugar beets. Sugar beets are grown in some sections in a small way for dairy feeding, but the yield is not as high usually as that of the mangels. While the feed value is a little greater, the labor and yield offset this advantage.

Carrots. Stock carrots are being grown more in those areas where there is difficulty in raising beets. Yields are high and the stock carrots have as good a feed value as do mangels.

Potatoes. Greater use should be made in this state of cull potatoes for dairy feeding. They have a feed value practically equal to that of corn silage. Many cows can be fed as high as twenty-five to thirty pounds daily without danger, while others may not handle more than ten or twelve pounds. Potatoes are of rather laxative nature and in some sections show a tendency to cause bloating when used in large quantities or especially if frosted slightly.

Pumpkins. Pumpkins and squash are a valuable supplement to the ration, especially in the fall and early winter. Their keeping qualities prevent use for a much longer time. They are rather low in food value, being a little less than the mangels and the other root crops. About three pounds of this material equals a pound of corn silage. The seeds need not be removed as they contain valuable food and are not injurious.

Kale. Kale is one of the most important crops of the west coast section and the Willamette Valley. In practical feeding tests, it is found to be practically equal to corn silage in feed value. Every dairyman in the western part of the state should grow some kale, but it is doubtful if he should depend upon it entirely for his succulent feed, as severe freezes and heavy snows often destroy it. Whether fed as the only succulent or in combination with silage or root crops, it is a valuable addition to the ration, having somewhat the same effect as green grass. Yields are high and the average cost per ton delivered to the barn is about $3.50.

Apple pomace. In apple districts greater use should be made of this material. It is practically equal to corn silage in feed value and is a palatable feed. It can be ensiled or may even be piled up, as it seems to cement over the outside more than does corn silage and spoilage is not nearly so great.

Apples. Apples have forty percent the feed value of corn silage and where there are many culls they should not be allowed to spoil, but should be used as a supplement to the dairy ration at the rate of twenty-five to thirty pounds daily.

GRAINS AND OTHER CONCENTRATES

Oats. Oats is excellent feed for dairy cows and is used as a basis of rations especially in the western part of the state. It is higher in protein than other grains; consequently, it is used without affecting the balance in the ration. There is no better grain for dairy cows.

Barley. Barley is also a valuable feed for dairy cows, and in this state is used largely as a substitute for corn. It is high in carbohydrates and is equivalent to corn for dairy feeding. It is not quite as palatable, perhaps, as corn, and should not be used alone in a ration, but should have other feeds added, such as oats and bran or oil meal.

Corn. Corn, of course, is the basis of rations in the Middle West, but is not so common in this area. It is one of the best of dairy feeds, but ordinarily can be used in this state only when its price compares favorably with that of barley.

Wheat. This material is usually too expensive to be used for cow feeding, but occasionally there is off-colored wheat that is better used as feed on the farm than to be sold. Wheat is a satisfactory substitute for barley or corn and takes the place of these materials in the ration.

Beet pulp is a carbonaceous concentrate which is slightly laxative and cooling in its effect. In a ration with bran and linseed-meal or cotton-seed-meal, its value is equal to that of corn. It is therefore worth no more per ton than corn and perhaps a little less, though for test cows it may have an added value. It is usually sold in two forms: namely, plain dried beet pulp, and molasses beet pulp. They have an equal feeding value and both should be fed with protein feed.

Molasses. Beet and cane molasses are a valuable source of carbonaceous feed. Beet molasses is the more laxative due to the high content of salts. On this account, greater care should be used when feeding. Cane

molasses, on the other hand, is only mildly laxative and may serve as a tonic for animals out of condition. Its nutritive value may be a little less than that of corn, but due to other qualities may be worth as much or more. Molasses is used by mixing it with about twice the amount of warm water and sprinkling on the hay, or it may be mixed with the grain. This material may have special value in the alfalfa sections where no succulent feed is available or in the Coast sections where some of the hay has become unpalatable.

Wheat bran. This concentrate is one of the best feeds for the dairy cow due to its beneficial laxative effect on the digestive system and because it is high in food protein and rich in phosphorus. At times other feeds, such as linseed-meal, soy-bean meal and cottonseed-meal are cheaper sources of protein, and under such conditions, a smaller amount of bran would be used in the feed. Its palatability also gives it added value in a ration.

Wheat shorts. This material is not very common as dairy feed in this state, and it is perhaps becoming less so. While it is high in digestible crude protein, it is less palatable and rather heavy, and should therefore be mixed with bulkier feed.

Mill-run. Mill-run varies considerably in feed value, depending upon the amount of screenings included. From some mills this is apparently a high quality feed, as good or possibly even better than bran. In other cases, it is of much less value. It is advisable to learn the different brands of this material and continue to use those brands that are found satisfactory.

Linseed-meal is one of the high protein feeds. It is not only rich in protein but is slightly laxative in effect, thus keeping animals in good order, and tending to tone up the system. It is one of the most palatable dairy feeds, and consequently is often used in mixtures that would otherwise not be palatable. Its popularity often makes it rather high priced, and other proteins can sometimes be purchased for less. Under certain conditions it may be advisable to use a lesser amount of linseed-meal and buy a portion of the protein in the cheaper form.

Soy-bean meal is another high protein concentrate and is coming into more general use in this country. It is fairly palatable, though not so much so as is linseed-meal, but is apparently just as digestible.

Cottonseed-meal. At times cottonseed-meal is a cheap source of protein in this state. It is not as palatable as linseed-meal, nor does it have the laxative effect. When cheaper than linseed-meal, or soy-bean meal, it can well be used to furnish at least a portion of the protein desired.

Cocoanut meal. Cocoanut meal has about one-third less digestible crude proteins than the other protein meals named, but it is just as high in total food value. It is less palatable and also less laxative in its effect than bran or linseed-meal. At some seasons of the year it can be so reasonably purchased that it is valuable from the standpoint of general food content regardless of its protein content.

Peanut meal. Rather recently peanut meal has made its appearance on the markets of this state. It is a high protein and a palatable feed. Ap-

parently, however, its manufacture has not been standardized as in the case of some of the other protein meals. The fiber content should therefore be observed on the tag or in the analysis on the sack. A high fiber content and a cheap price should go together. If very high in fiber, peanut meal may not be an economical feed.

CALF FEEDING AND CARE

In the raising of dairy calves an old saying might be changed to read, "A good start is half grown." This does not mean that the raising of calves is necessarily so difficult, but emphasizes the importance of paying close attention to details. Because of the decided advantage given by a good start, it is advisable that the mother receive proper care and attention before the birth of the calf. She should be allowed to be dry six or eight weeks before its arrival and during this time should receive the proper kind and amount of nourishing feed. Unless the cow is in very good flesh the grain allowance should be liberal. In any event, about a week prior to freshening, the grain allowance should be cut down to prevent the cow going off feed. Cutting down the amount of grain also tends to lessen the possibilities of milk fever. Wet mashes are advantageous, both immediately before and after freshening. In cold weather warm water may be used to make the mash. From the standpoint of the calf's health it would be of advantage if all births could take place in the pasture. If there is any disease in the herd, however, this would be the surest method of spreading it, and consequently to be safe it is best to provide box stalls. These should be kept scrupulously clean and supplied with bright clean bedding.

If the calf does not stand to suck within an hour after birth it should be assisted. It is not likely that further assistance will be necessary unless the calf is exceptionally weak.

It is often a good plan to allow the calf to remain with its mother for at least two days, permitting it to get the colostrum milk (the first milk), which is necessary to a proper start. Leaving the calf with the cow is beneficial also to the cow's udder. If allowed to remain with the mother longer than the two days, however, both the calf and the cow will be more disturbed when the separation takes place, and it will be more difficult to teach the calf to drink.

Teaching the calf to drink. At the end of the two days, when the calf is taken from the mother, it is necessary to teach it to drink. This is often a difficult step and the more difficult it is the greater the hardship on the calf. It is essential, therefore, that patience be exercised in giving this instruction. The operation is sometimes made easier if the calf is allowed to get quite hungry before giving it this first drink.

For the first four or five days the mother's milk should be fed the calf. After that time milk from any cow in the herd may be used.

Amount to feed. The amount of milk given should vary according to the size of the calf. Some feeders recommend one pound of milk for each eight or ten pounds the calf weighs. Others suggest about six pounds for a Jersey calf weighing 50 pounds, and 10 or even 12 pounds for large Holstein calves weighing approximately 100 pounds. For calves

in between these sizes proportionate amounts can be fed. For the first three weeks there is an advantage in feeding three times daily. This will, of course, necessitate increased work, but the advantage gained by giving the calf a better start should offset this.

Because of its cost, whole milk is not generally used for calf feeding for any length of time, and it has been thoroughly demonstrated that calves fed skim milk develop into equally as good cows as those fed on whole milk. In fact, it sometimes happens that the better fed calves, because of their pampered condition, may not so satisfactorily come through the abrupt change at weaning time.

Changing to skim milk. It is usually advisable, however, to feed whole milk for the first two weeks, then to change the amount gradually, lessening the whole milk and adding a corresponding amount of skim milk until at the end of the fourth week the calf is on a straight skim-milk ration.

Feeds where skim milk is scarce. The latest development in calf feeding where skim milk is scarce is the use of skim-milk powder or dry buttermilk. Condensed buttermilk is also used. The dry material is probably easier to handle. One pound of the dry product is mixed with nine pounds of water at 95 to 100 degrees F. The resultant mixture is the equivalent of the same amount of skim milk. Because of its higher price, however, it is usually used in lesser amounts. These dry products are also used in the grain mixture, thus shortening the time that fluids are used. Each dairyman must determine whether the price he receives for his milk will justify his using the dry material.

Calf meals, home mixed or proprietary, are giving fairly satisfactory results, but even the best of these give better results if a small amount of milk is used. One of the common home mixtures, known as the Purdue mixture, is as follows:

Equal parts of hominy meal (or corn meal), linseed-meal, red dog flour, and blood meal. This is fed by taking one-half pound of the mixture and stirring it into three pints of boiling water and allowing to cool to 95° F. This is the amount of one feed for calves one month old, fed twice daily. For older calves the amount fed per day need not exceed one and one-half pounds.

Another good calf meal is the Beltsville calf meal, used and recommended by the Bureau of Dairy Industry at Beltsville, Maryland. It is made as follows: 50 parts finely ground corn, 15 parts linseed-oil meal, 15 parts ground oats, 10 parts dried blood flour, 10 parts skim-milk powder, one-half part salt. Mix at rate of one pound of meal to nine parts of water. Start gradually and increase as whole milk is decreased until at fifty days of age the calf is getting only gruel. At that age one and one-half to two pounds will be a day's feed. Grain and hay should be fed with these substitutes as when skim milk is fed.

Temperature, regularity, etc. The temperature of the milk fed is very important. Some recommend that it should be about 100° F., while others suggest that it should be about 95° F., since that is the temperature of drawn milk. The same temperature should be used at all times, allowing no variation, and it is best to use a thermometer rather than to

guess. Milk that is freshly drawn will not have to be heated, except in colder weather, but if allowed to stand very long, it should be heated even when the weather is warm.

Regularity of feeding is highly essential. Whether on three-times-a-day feeding or twice-a-day feeding, it is necessary that the periods be equally divided and that feeding be done at the same hours each time.

Cleanliness of pails and utensils used in feeding the calves cannot be over-emphasized. Pails in which the calves are fed should be scalded after each feeding, and not allowed to remain in the manger or pen.

Older calves fed more. Depending on the vigor of the calf, the amount of milk may be gradually increased so that by the time the calf is six weeks old it will be getting 15 to 18 pounds daily. Calves may be properly developed if they never receive more than 15 pounds daily, and it is unnecessary to feed more than 20 pounds daily at any time even though milk is very plentiful.

The calf may be weaned at six months of age or may be given milk to the seventh or eighth month or even longer. In most cases, however, the calf is weaned during the sixth month. If the supply of milk is short weaning may take place earlier if liberal amounts of grain and hay are substituted for the milk.

In raising calves by hand they should be confined in stanchions until they have consumed their milk and grain. This will largely prevent sucking one another's ears or udders.

Grain feeding. Beginning the third week the calf may be taught to eat grain. This is done by either placing a small amount in the bottom of the pail after the milk has been drunk or placing a little in the calf's mouth. After the calf begins to like the taste of the grain, a small amount may be placed in a box or trough where accessible. A mixture of either barley and oats in equal parts, ground or rolled, or corn and oats may be used. A more palatable mixture is obtained by adding some bran and a little oil meal.

In two weeks time the grain allowance may be increased to one-half pound daily, and by the time the calf is two months old it may amount to one pound per day. At five months the grain ration may amount to three pounds daily, or if there is plenty of good roughage or pasture and the calf is doing well, it may be left at two pounds per day.

From the seventh to the tenth month good pasture may replace grain and roughage, but there must be plenty of it and of good quality. In winter feeding, at that age, the grain mixture may still be two to three pounds daily, while it may be entirely discontinued after ten months of age if hay and succulent feed are of good quality. If the calf is not as thrifty as it should be, however, the grain may be continued.

Hay feeding. Hay is apparently important in the calf's ration, not only because it is economical, but also because it seems essential to proper development. The calf will begin eating hay about the third week. A handful at a time is enough at first but the calf should be encouraged to eat more as it grows older until when eight months old it will be consuming about eight pounds if on winter feed. Clover and alfalfa or oats and vetch are usually preferred. When the calves are very young, how-

ever, clover and alfalfa may tend to produce scours. If this is noted, the amount fed can be lessened or a mixed hay may be substituted for a time.

Succulent feeds. Silage may be fed to young calves not on pasture or before they are turned to pasture. Silage should be free from mold and not too sour. Only small amounts should be fed the young calves as it is preferred that they eat hay. When the calf has passed the sixth month and is on winter feed the amount of silage can then safely be increased until the calf will be consuming about twenty pounds at one year old.

Roots can also be used. In some cases they have given better results than silage and there has been less trouble from scours than with silage.

Pasture. Pasture is of little value to calves under two months of age, and often it is better to wait a little longer before turning them on it as there will be less trouble from scours. In some sections, due to heat and flies, pasture is of doubtful value to spring calves during their first summer. In such cases they should be protected during the day time. Fall calves will make good use of pasture the following summer, and if it is of excellent quality it may replace all other feed after the seventh or eighth month.

Water, salt, minerals. Calves will begin to drink water the third or fourth week and will soon be drinking several times a day, a little at a time. It is best to have water before them at all times, but if this is not possible they may be watered twice daily in pails.

The calves should be supplied with salt as soon as they start eating grain and hay. Best results are obtained by placing salt where it will be accessible.

If the calves are getting plenty of skim milk and clover or alfalfa hay, the addition of minerals is not ordinarily required. If there is any doubt about their getting enough mineral matter, one-half to one ounce of sterilized bone flour may be used in the grain ration.

Sanitation. Cleanliness of feeds fed as well as of utensils used is of great importance. Unclean or diseased milk has the effect of so much poison to the calf. An unclean pen and lack of sunlight or proper ventilation are handicaps which may prevent proper development and at best will increase costs of raising.

Care of pen. The calf pens should be kept clean and fresh bedding supplied daily. The quarters should be light and well ventilated. A dark, foul pen is not conducive to health or satisfactory growth.

FEEDING AND CARE OF THE SIRE

For the first six months the bull will be cared for much as will the heifer calves, though it is especially desirable that he be given a good start and cost of the ration will not be so much of a consideration as in the case of the heifer calves. It is desirable to have a good growthy individual at the head of the herd, for an under-sized herd sire is a dis-

advantage when it comes to the selling of young stock and often discredits the dairyman as a feeder.

Skim milk is often fed to bulls for longer periods than for the heifers, heifers being usually weaned at six months while the bull calves are sometimes carried on to eight or ten months. If fed good leguminous hay, or if he has the run of good pasture in addition to a grain mixture, the bull calf can be weaned at an earlier age. It is highly desirable to keep the bull growing and he should be fed grain if necessary to get such results. A good mixture would consist of five parts of bran, four of ground oats, and one of linseed-meal.

When the bull is mature, he should still be kept in good condition. Too frequently the herd sire is put in a dark corner, and not given the proper care he should receive. A herd sire is more than half of the herd, and should be treated accordingly. He should, therefore, receive exercise and should be kept in excellent condition, but not fat. A good grain ration for a mature bull should consist of two parts of barley, four parts of ground oats, three parts of bran, one part of linseed-meal. The amount fed will depend upon the condition of the animal and the amount of service expected. Doubtless much sterility in herd sires could be prevented if the animals had been properly cared for; if, for instance, they had been kept in a thrifty condition, given plenty of exercise, allowed some green feed throughout the year, given a legume hay, and not allowed too heavy service. It is inadvisable to allow the bull to run with the cows in pasture.

Exercise yards with a shed or barn in connection should be provided and may be so arranged with gates and doors that it will be unnecessary to enter the pen or barn when the bull is loose. Plans for such a pen will be furnished upon request or they may be obtained from U. S. Farmers' Bulletin 1412.

Fences should be made of heavy material such as 2" x 8" plank; in many sections of the state poles may be used to advantage. Never trust a bull. Watch even the most gentle ones, and teach them early to be handled with a staff. Many accidents will thus be avoided.