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**WINTER'S
HERE!**

But to Win the War there must be no "Slow Down"
In the Poultry-Livestock Production Line

Feed For
**MILK-EGGS
PORK**

Biting Zero Weather and No Green Feed
Makes Winter a Difficult Time for Livestock
To Hold Their Own and Produce
Meat, Milk and Eggs

SOUTH DAKOTA EXTENSION SERVICE

South Dakota State College, Brookings, S. D.

Extension Circular 396

November 1942

Making Milk, Pork, Eggs

R. A. CAVE, G. A. McDONALD, RICHARD HEEREN, JOHN M. RYAN*

The biggest service that farmers can give to the nation in war is greater production of meat, milk and eggs. Uncle Sam is calling upon South Dakota farmers for greater production of these products throughout this winter and for next year.

In many years of the past, it would not be possible for our state to provide this greater production but now it is different—we now have the greatest feed supply in our history, thanks to the bountifulness of nature last year.

To use our vast feed supplies most efficiently—to get the maximum amount of human feed from them—stricter attention to proper winter feeding methods must be given.

It will require the utmost cooperation and teamwork between farmers, U. S. Department of Agriculture Neighborhood Leaders, county extension agents and experiment stations to see that not a bit of feed is wasted; that it all goes to make every bit of human food possible.

There are probably two main faults or disadvantages to the winter feeding methods of South Dakota farmers. These are:

1 **Simply not feeding enough.** Increasing the feed of our livestock and poultry to an adequate amount would do more to increase production than any other one improvement which might be made. Too often the common practice is to feed only enough to maintain the animals. This habit is not a charge of neglect—the situation grew up during the drouth years when we did not have enough feed. We learned that we could maintain our herds—keep them alive—by very skimpy feeding with poor feeds. It is an astonishing statement but veterinarians say that the principal contributing factor of many diseases is because the animal is in a run-down condition from scanty feeding and falls an

easy victim of disease. Good feeding develops vitality and resistance.

2 **Loss of our Alfalfa.** During the past 15 years, more than half of the alfalfa in South Dakota, and in many sections all of it, has been lost. Alfalfa hay contains many of the minerals needed by livestock and also contains about 15 percent protein of good quality. All classes of livestock, depending upon their use, need a total of from 11 to 18 percent protein in their daily feed. It may be seen that an animal receiving alfalfa can thus receive most of his protein requirements from this feed.

Most of the alfalfa has been replaced by sorghums, both forage and grain. Sorghums predominate in energy or maintenance nutrients but are very deficient in protein and mineral. The protein and minerals livestock formerly received from alfalfa must now be supplied from another source.

Things to Watch In Winter Feeding

Protein. During the summer livestock and poultry pasture on green grass which contains a large proportion of protein because it is green and growing. It also contains considerable water. In the winter, most animals have to get along largely on dry hay, fodder, straw and grain, all of which are low in protein. This immediately places the problem of supplying sufficient protein in winter right into the foreground.

Comfort. Lack of comfort is another factor which keeps livestock from making meat, giving milk and laying eggs in winter. Discomfort is caused by exposure, lack of bedding, drafts, dampness, etc. A certain amount of the feed they consume is used to keep their bodies warm; to keep their temperature up to normal, if they are

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to be comfortable. A cold shivery cow will give little milk. The colder the barn or shed the more of the feed must go to keep the temperature normal. Some form of shelter, a straw shed or a windbreak for stock outside, a straw loft, nailing up the cracks and holes and banking the foundation actually saves feed because the livestock will not have to use as much of their feed to keep them warm. An uncomfortable animal will not produce well.

Water. Livestock and poultry usually do not drink enough water during the winter. The water they drink aids in the mastication, digestion, absorption of their feed into their bodies where it can go to work in making meat, milk and eggs. Since milk contains 87 percent, an egg 66 percent and a fat hog 50 percent water, it can be seen livestock need all they want all the time.

Often the tank is located in a cold windy place. Cows which have to brave the wind to get a drink will not drink all they need. Covering the tank, banking with manure and using a tankheater to keep freezing to a minimum will encourage them to drink more. Replenishing the water supply of hogs and poultry several times a day will enable them to drink what they should have.

Minerals. Buying mineral supplements when they are not needed is a waste of money. In general, the only minerals likely to be short in South Dakota feeds are common salt, calcium and phosphorous. In some areas, a small amount of iodine may be necessary to prevent goiter. A good mineral mixture for all classes of livestock is ground limestone 40 parts, steamed bonemeal 40 parts, common salt 20 parts, with salt added, free choice. If there is trouble from goiter, use iodized salt. Laying hens should have oyster shells before them all the time to prevent soft-shelled eggs.

Vitamins. Vitamins A and D for all classes of livestock and Vitamin G for poultry are likely to be deficient in winter feed. Vitamin A is necessary for growth, reproduction and for the animal to make meat, give milk and lay eggs. Carotene, the yel-

low substance in yellow corn, carrots and butterfat, is converted to Vitamin A in the body. All green growing plants provide abundant carotene but much of it is lost in curing hay and fodder. If cured properly more of the green is retained; making it a good Vitamin A source. With the exception of yellow corn, grains contain little carotene. Whole milk and fish liver oils are high in A. Skimmilk contains little since it goes with the butterfat.

Vitamin D is necessary so the animal can use calcium and phosphorous. If Vitamin D is lacking, rickets in calves, pigs and chickens and crooked breastbones and soft shelled eggs in chickens are likely to appear even if they have plenty of calcium and phosphorous. The greatest source of Vitamin D is sunshine. In winter animals do not receive as much sunshine and winter sunshine does not furnish as much Vitamin D as in summer. This may make it necessary to supply it from another source.

Vitamin D is also found in sun-cured hay, whole milk, fish liver oils and irradiated yeasts. Green growing plants, cereal grains, roots, skimmilk, meat scraps and tankage contain no appreciable amounts.

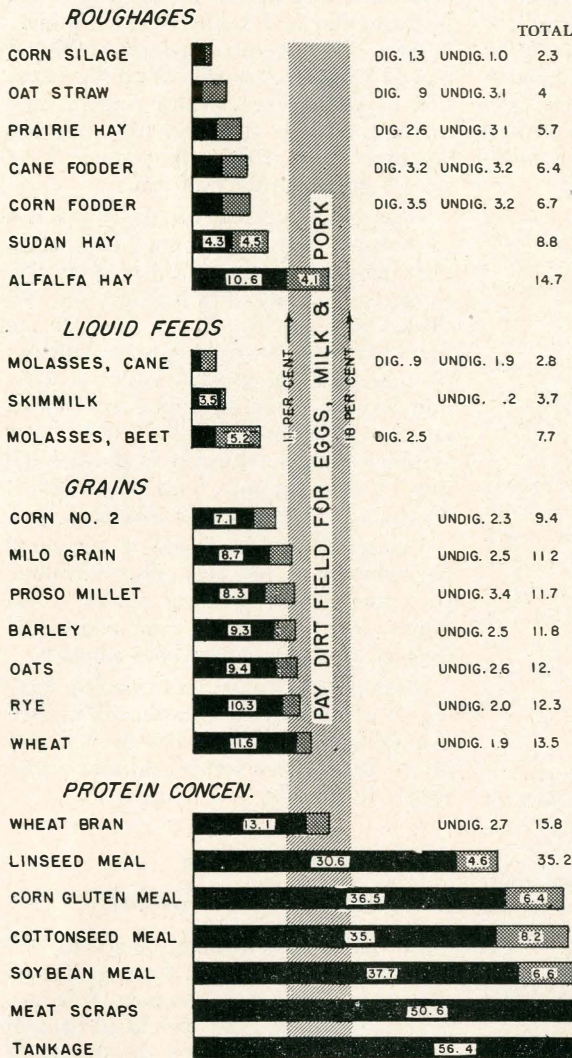
Vitamin G is important in poultry feeding. It is required for growth. Milk, dried skimmilk, buttermilk and whey will supply it. Yeast, green forage and alfalfa also supply it liberally.

How About Soft Corn And Damaged Small Grain?

The best way to use soft corn is to feed it to beef cattle or hogs. Damaged small grain should be fed only to hogs. Soft corn or damaged small grain should all be used before spring to cut down the danger of spoilage in warm weather.

Soft corn is considered about three-fourths equal to number 2 corn. Soft corn is not very suitable to milk cows since it cannot be ground and mixed with other feeds. If moldy, soft corn may cause animals to go off feed. Soft corn and damaged small grain should never be fed to poultry, sheep or horses. Scabby barley can be fed to cattle but not to hogs.

Protein Content of Various Feeds



Pay Dirt Field Is 11 to 18%

DIGESTIBLE PART of protein bars must reach into PAY DIRT field for maximum eggs, milk and pork.

Milk cows, without alfalfa, need a 16% digestible protein GRAIN ration; laying hens 18%; fattening hogs, 11%.

Help Short Bars Reach Pay Dirt by Using Long Bars!

All of the protein in any feed is not digestible—a portion is undigestible and cannot be used by the animal. The percentage of protein stamped on the bag of commercial feeds usually means the total protein in the feed. Figure protein needs of an animal on the percent of "digestible protein."

Relative Value of Feeds When Corn Is Worth 70¢ Per Bu. and Cottonseed Meal \$55 a Ton

*If Corn Is Worth 70¢ a Bushel
and If Cottonseed Oil Meal Is
Worth \$55 a Ton:*

Milo Grain Then Is Worth 67¢ a Bushel*

Corn Silage Is Worth \$5.10 a Ton

Oat Straw Is Worth \$6 a Ton

Prairie Hay Is Worth \$11 a Ton

Sorghum Fodder Is Worth \$11.40 a Ton

Corn Fodder Is Worth \$11.50 a Ton

Sudan Hay Is Worth \$12.10 a Ton

Alfalfa Is Worth \$20.73 a Ton

Molasses, Cane, Is Worth \$13.50 a Ton

Skim milk Is Worth 43¢ per 100 lbs.

Molasses, Beet, Is Worth \$15.25 a Ton

Proso Millet Is Worth 68¢ a Bushel

Barley Is Worth 65¢ a Bushel

Oats Are Worth 41¢ a Bushel

Rye Is Worth 79¢ a Bushel

Wheat Is Worth 91¢ a Bushel

Wheat Bran Then Is Worth \$29.50 a Ton

Linseed Oil Meal Is Worth \$53.85 a Ton

Corn Gluten Meal Is Worth \$57 a Ton

Soybean Oil Meal Is Worth \$59.50 a Ton

Meat Scraps Are Worth \$72 a Ton

60% Tankage Is Worth \$79.42 a Ton

***EXAMPLE:** If corn costs 70¢ a bushel, milo grain is a better buy if it costs less than 67¢ a bushel; if it costs more, corn is a better buy. The prices given for all feeds are the maximum they are worth as feeds with 70¢ corn and \$55 cottonseed.

Why is Protein Important?

Proteins are important in animal feeding because, in digestion, they are made into "amino acids." Without amino acids in the body, the animal cannot make muscles, cartilages, connective tissues, skin, hair, wool, feathers, nails, horns and keep his organs functioning properly. He uses amino acids for "building blocks." A protein is the only part of a feed out of which an animal can make an amino acid and without an amino acid he cannot live, grow, put on meat, produce wool, milk and eggs. After he has used amino acids to maintain himself, he must have some left over to make eggs, milk or meat.

Since milk contains 3.5 percent protein, pork, 17, and eggs 13 percent, it can be seen that the feed must contain considerable protein to supply feed needs. Proteins are not all alike; they may be high or low quality according to the amino acids they furnish. About 22 amino acids have been identified in proteins, 10 of which are considered essential for the animal and his production.

Farm grains are lacking in protein and also contain too small amounts of one or more essential amino acids to produce good results if they are the only protein source. That is the reason why farm grains should be supplemented with animal or vegetable proteins. Protein supplements will not only boost the total amino acids but it will give more of a chance to get the different ones needed. Milk protein is about the most complete in necessary amino acids. Meat, fish and soybean oilmeal also contain high quality protein.

The loss of alfalfa acreage has made the protein situation more serious in South Dakota because it supplied many of the needed proteins. When it is gone, we must use other protein sources.

Milk Cow Must Have "Milk-Making" Material

A milk cow is a small factory making milk, a vital war product, out of feed, the raw material. The amount of milk produced will depend largely on the amount and kind of feed put into the factory.

There are 87 pounds of water in every 100 pounds of milk and the milking herd should have 12 to 15 gallons of water per cow per day. The water must be warm and the place she goes to drink sheltered so she will drink that much. The 13 pounds of solids in 100 pounds of milk are about 27 percent protein—she can get it no where else but in her feed.

A cow producing 14 quarts of 4 percent milk a day needs nearly 2 pounds of digestible protein a day. To get that much protein from roughage alone she must eat 52 pounds of corn fodder, 61 pounds of sorghum fodder, 70 pounds of prairie hay or 154 pounds of corn silage. No cow can eat anywhere near that much. She must receive grain and protein concentrate in addition to the roughage to get the needed protein.

If she is getting alfalfa hay, no protein concentrate need be added to the grain. Without alfalfa, feed a coarsely ground grain mixture (use oats, barley, corn, grain sorghum or wheat), mixing one part protein concentrate to each three parts of the grain mixture, running it through the grinder for mixing.

If good leafy alfalfa hay can be purchased for \$12.50 to \$14 a ton, it probably will be cheaper than buying protein concentrate.

One pound (about one quart depending on weight of mixture; 32 quarts to a bushel) should be fed each day to each 3 lbs. (3 pts.) of milk for Jerseys and Guernseys; and 3½ to 4 lbs. for Holstein, Brown Swiss and Shorthorns. This will cost money but the added milk you receive will more than pay for the cost.

Feed Requirements of 1000-lb. Cow Producing 30 lbs. 3.8% Milk Daily

	Protein	Total digestible nutrients
Body maintenance	.700	7.925
30 lbs. 3.8% milk	1.560	9.810
	<hr/> 2.260	<hr/> 17.735

Here are rations that will furnish the 2¼ pounds of protein and more than 17 pounds of total digestible nutrients:

No alfalfa or silage		Alfalfa but no Silage	
Prairie Hay	10 lbs.	Alfalfa	10 lbs.
Sorghum Fodder	10 lbs.	Sorghum Fodder	10 lbs.
Grain Mixture	10 lbs.	Grain Mixture	10 lbs.
(Equal parts corn cob meal, gr. oats, barley, soybean oilmeal)		(Equal parts corn & cob meal, gr. oats, gr. barley)	
Silage but no Alfalfa		Alfalfa and Silage	
Prairie Hay	5 lbs.	Alfalfa	10 lbs.
Sorghum Fodder	5 lbs.	Silage	30 lbs.
Silage	30 lbs.	Grain Mixture	10 lbs.
Grain Mixture	10 lbs.	(Equal parts gr. corn, gr. oats and gr. barley)	
(Equal parts gr. corn, gr. oats, gr. barley, soybean oilmeal)			

Amazing Results With Better Poultry Feeding

Breathing and temperature of the hen are so much different than other classes of livestock that in winter, good housing is fully as important as good feeding. A hen's heart beats 300 times a minute, compared with a man's 72, probably partly explaining their high water needs and high body temperature. The normal body temperature of a hen is 106.7 degrees, compared with 98.6 of a man; they breathe about 36 times a minute compared with a man's 15 to 20. They need more careful feeding and housing than other animals to maintain their high body temperature. Since they breathe much faster, have no sweat glands nor liquid discharge from their kidneys, they throw off considerable moisture through their breath and droppings, leading to damp, unhealthy, unsanitary conditions if ventilation is not adequate. This shows why Leghorns should have 3½ square feet; heavy hens, 4 square feet of floor space per bird.

Hens require (their live weight being equal) nearly FOUR TIMES as much air as man or the cow. A straw loft, placed 6½ to 7 feet above the floor with ventilators opening above, will permit the moisture thrown off in the hen's breath and droppings to pass out through the loft, keeping it warm, draft-free, dry and healthy in the house. Banking the house, repairing holes and cracks to help the hens keep

up their high normal temperature will help them fill the egg basket.

The common way to feed laying hens; to scatter whole grain on the floor of the house. This is NOT THE RIGHT way to feed to get eggs. Poultry should have two feeds: A liberal feed of whole grain; and in addition a balanced mixture known as a "laying mash." The whole grain or "scratch" feed goes for body maintenance; the eggs come from the laying mash.

The addition of a laying mash to the feed will give amazing results; often tripling the egg production. In experiments, hens fed only a grain feed laid only 57 eggs a year per hen; when a laying mash including 20 percent protein meat and bone meal was added, they laid 179 eggs per hen a year, more than tripling their egg production. The added cost was returned several times over, the first group making only 35 cents above their feed cost; the second making \$2.47 per hen per year above their feed cost.

To get more eggs than you have ever got in your life, put in a straw loft, throw out sick birds as soon as detected, fix up the poultry house, and then feed grain, oyster shell, grit and plenty of water and IN ADDITION mix up a laying mash like either of the following and put in a feeder:

WITH ANIMAL PROTEIN

Ingredients	pct. or lbs.
Wheat, corn, sorghum grain or combination of these	44
Finely ground oats or barley	23
Soybean oil meal	10
Meat and bone scraps	6
Alfalfa leaf meal	7
Dried milk, buttermilk or distiller's grain* ..	5
Fish oil or other Vit. D. source† ..	2
Steamed bonemeal	2
Salt	1
TOTAL	100

WITHOUT ANIMAL PROTEIN

Ingredients	pct. or lbs.
Yellow corn meal	40
Ground wheat or barley	20
Alfalfa leaf meal	8
Soybean oilmeal	11
Corn gluten meal	7
Distiller's grains* ..	5
Steamed bonemeal‡	5
Limestone	1
Salt or other Vitamin D source†	2
TOTAL	100

Hogs Need Protein Balanced Ration to Gain Properly

The feed needs of the fattening hog can be seen from the make-up of the fat market hog's body which contains 50 percent water; fat, 28; protein, 14; ash, 2½, and hide and body covering, 5½ percent. Since corn and other common farm grains contain only about 6 to 10 percent digestible protein, they do not provide all that the fattening hog needs to make pork. To get good gains and make grain go further, it is necessary to balance the ration with high protein feeds such as skimmilk, tankage or soybean oil meal. Feeding trials show that hogs receiving a correctly protein-balanced feed were ready for market 26 days sooner, saving considerable feed. One pound of tankage will save six to seven pounds of corn. When protein balance is not provided, you are, therefore, wasting feed and time. If they have no protein supplement, the hogs must eat a surplus of grain to get the protein they must have. Here are several balanced feed mixtures:

For 30-100 Pound Pigs

MIXTURE 1	MIXTURE 2
Shelled corn, 85-90 lbs.	Ground, self fed Barley,
Tankage, 10-15 lbs.	Skimmilk, 3-4 pts. a
	head daily or Tankage
	6-8 lbs per each 100 lbs
	grain

For 100-175 Pound Pigs

MIXTURE 1	MIXTURE 2
Shelled corn, 90-92 lbs.	Ground shelled corn 50
Tankage, 8-10 lbs.	lbs.
	Ground barley, 42 lbs.
	Tankage, 8 lbs.

Wheat or sorghum, coarsely ground, may be substituted for corn in these rations. All rations should be self fed free choice. There is definitely NO ADVANTAGE in soaking grain.

* Distiller's grain not recommended if hatching eggs are to be saved. Liquid skimmilk kept before birds at all times will fill all milk needs.

† Vitamin D source should contain at least 85 units of Vitamin D per gram. If 400-D oil is used, only 0.4 percent is needed.

‡ Steamed bonemeal is essential in this ration because it contains no animal protein.

A mixture of equal parts tankage, linseed and soybean oil meal (self fed) is better than either one alone. Skimmilk will improve this mixture or may replace the protein supplement. However, a 150-200 pound hog should not receive more than 1½ to 2 gallons per day.

To make more meat, feeding hogs to heavier weights (300 or more pounds) is urged this year. It takes more feed to put gain on a heavy hog but the present good hog price and reasonable feed price will make it profitable.

Brood Sow Feed Says "Good or Poor" Pig Crop

Because she is nourishing unborn pigs, the brood sow also needs a feed high in protein and mineral but she should not be fed too much of fattening grains. She should be fed to gain 75 to 100 pounds during her gestation but should not become overly fat. Gilts need 1¾ to 2 pounds of grain per day for each 100 pounds they weigh; older sows 1½ to 1½.

Good brood sow feeds are:

1. Two-thirds shelled corn or Sooner Milo & ⅓ whole oats
2. One-third shelled corn, ⅓ gr. barley & ⅓ gr. oats

A mineral mixture should be provided throughout gestation for the gilt and at least the last six or eight weeks for the mature sow.*

If alfalfa is available it should be fed as it contains the protein, Vitamin A and D and minerals the brood sow needs. It may be fed in racks. If alfalfa is fed, only about one-third pound of tankage or protein mixture a day will be necessary. Without alfalfa, about a half pound of protein mixture is needed. One gallon of skimmilk per day will replace other protein supplements.

*A more complete mineral mixture for the brood sow is:

Gr. limestone, 50 lbs.	Iron oxide, 2 lbs.
St'med bonem'l, 28 lbs.	Potassium iodide, 1 oz.
Common salt, 20 lbs.	Copper sulphate, ½ oz.

These Publications Have Further Information. Ask Your County Extension Agent.

GENERAL FEEDING: USDA Misc. Circ. 12, *Handbook of Better Feeding of Livestock*
Exp. Sta. Bul. 219, *Soft Corn for Fattening Cattle*

POULTRY: Ext. Circ. 389, *Feeding and Management for Egg Production*
Ext. Circ. 386, *Poultry Management*
Ext. Leaflet 69, *Help Your Hens Lay More Eggs*

HOGS: Ext. Circ. 378, *Swine Production*
Ext. Leaflet 70, *More Pork from Feed*

DAIRY: Exp. Sta. Bul. 231, *Feeding Dairy Cows for Profit*
Ext. Leaflet 54, *Milk for Victory*

BEEF CATTLE: Ext. Circ. 393, *Beef Production*

SHEEP: Ext. Circ. 367, *Sheep*
Ext. Leaflet 53, *Lamb and Wool Production*

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