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FEEDING TO PREVENT MILK FEVER

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MILK FEVER is a metabolic disease, (one which affects the body's utilization of nutrients) afflicting female mammals either just preceding or soon after giving birth.

In cattle, incidence of milk fever (parturient paresis) is more common in older cows and three to five times greater in Jerseys than in other common breeds. Symptoms of milk fever in cattle are: dull eyes and actions, low body temperature, cold ears, staggering, slight muscle spasms, drowsiness and/or lying on the sternum with the head tucked into the flank. In advanced stages, there is complete paralysis and coma, often followed by death.

Generally, these symptoms begin when calcium levels in the blood are reduced to about two-thirds of normal. Failure to mobilize sufficient calcium from the bone into the blood to offset the heavy secretion of calcium into milk at the onset of lactation is involved. Recent studies show that susceptibility to milk fever is increased with high levels of calcium relative to phosphorus (Ca:P ratio) in the diet of cattle prior to freshening.

Feeding monosodium phosphate instead of mineral supplements containing calcium (calcium carbonate ($CaCO_3$), bonemeal, and dicalcium phosphate, essentially eliminated the disease in test herds fed principally alfalfa hay and having a 30-74% incidence of milk fever. Monosodium phosphate contains no calcium (Ca) but about 22% phosphorus (P) which results in reducing the Ca:P ratio in the diet. Alfalfa contains about 1.5% calcium and 0.25% phosphorus for a ratio of 6Ca:1P.

While milk fever is not limited to cows fed alfalfa, herds having a high incidence of milk fever are usually fed alfalfa hay or haylage as the chief forage. Likewise, some commercial mineral supplements have Ca:P ratios greater than 6:1. Mineral and protein supplements with a calcium:phosphorus ratio (%Ca ÷ %P) greater than 2.33:1, contain added calcium, probably as limestone ($CaCO_3$). Such supplements should be avoided since they tend to widen the Ca:P ratio, which may increase incidence of milk fever.

Feeding Program for Dry Cows

The feeding program for dry cows in herds having a high incidence of milk fever should be adjusted to reduce the intake of calcium and/or increase the intake of phosphorus. The resulting Ca:P ratio in the diet should be approximately 1:1 and not higher than 2Ca:1P. Feeding programs that meet these specifications are shown in the accompanying table.

Grass hay (timothy, brome, etc.) and corn silage are low in calcium content and should be substituted for alfalfa hay during the dry period in herds having a high incidence of milk fever. Feeding a low calcium grain ration of up to 1 lb. per 100 lbs. body weight will also reduce alfalfa intake and narrow the Ca:P ratio.

Note that in Table 1:

- Alfalfa hay must be limited to 10 lbs. per day or less in order to achieve a low Ca:P ratio in the dry cow ration.
- Minerals, other than trace mineralized salt, should not be fed unless they provide the same Ca:P ratio and similar percentages of Ca and P as the supplements shown in the feeding pro-

gram. Indiscriminate use of other mineral supplements could upset the desired Ca:P ratio.

- When 10 lbs. alfalfa hay is fed, it is necessary to feed a phosphorus source containing no calcium in order to achieve a Ca:P ratio less than 2:1. Monosodium phosphate can be obtained through feed suppliers.
- Corn silage as the only forage will be borderline or slightly deficient in both calcium and phosphorus unless supplemented with a mineral such as dicalcium phosphate, bonemeal, or a low calcium commercial mineral supplement.

Benefits from a lower Ca:P ratio during lactation are questionable, although monosodium phosphate was fed to all cows year-round in one trial with good control of milk fever. In such cases, however, the ration must contain enough calcium (at least 0.30% Ca and P) to meet production requirements.

Although rations low in phosphorus can be a cause of poor fertility in cattle, there is no published evidence that narrowing the Ca:P ratio will improve conception rate. This possible side-benefit has not been proven to date.

Vitamin D Therapy

Vitamin D therapy is also effective in preventing milk fever. Feeding 20 million units D_2 or D_3 each day for three to seven days before calving and one to two days after calving prevented milk fever in 80% of cows having a previous history of milk fever. Feeding at this level must not extend beyond a seven-day period or harmful effects from tissue calcification may occur.

Similarly, an intravenous or intramuscular injection of 10 million I.U., (250 mg crystalline Vitamin D_3) 2 to 8 days before the expected day of calving to cows with milk fever history prevented the disease in 84% of the animals. A second intramuscular dose has to be given if the cow has not calved within 8 days after the first dose. This method appears to hold promise when a readily available supply of water miscible D_3 can be obtained. The effectiveness and/or problems of using oil suspended D_3 in large doses has not been reported.

Limited research indicates that continuous feeding of 100,000 to 500,000 units of vitamin D per day (32,000 units/lb. of grain) reduced incidence of milk fever from 75 to 29% in cows with a previvous history of milk fever. However, in cows with no previous history of milk fever, incidence of the disorder was 14% without vitamin D, but was increased to 30% in a similar group fed vitamin D at the above levels. These results suggest caution in continuous feeding of high levels of vitamin D to all cows in a herd.

Results to be expected from continuous feeding of vitamin D at near requirement levevls of 5,000 to 20,000 I.U. per day are not known.

The vitamin D therapy approach attempts to solve a problem that may have been created by a poor Ca:P balance in the diet, thus it seems reasonable to adjust the mineral balance in the diet as a first step in preventing milk fever.

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Dry Cow Feeding Programs With Low Ca:P Ratios

	Intake	Ca grams	P	Ca/P
I Corn silage (free choice)	70-75 lb.	22.4	22.4	
Soybean meal	1 lb.	1.3	2.9	
Total from feeds		23.7	25.3	0.94:1
Dicalcium phosphate	2 oz.	15.0	11.9	
Trace mineral salt	free choice			
Total		38.7	37.2	1:04:1
II Grass hay	25 lb.	39.7	17.0	
Grain (corn, oats)	4.5 lb.	0.4	5.5	
Soybean meal	0.5 lb.	0.6	1.4	
(or 5 lb. of 12% protein ration)				
Total from feeds		40.7	23.9	1.70:1
Monosodium phosphate	3 oz.	0	19.0	
Trace mineral salt	free choice			
Total		40.7	42.9	0.95:1
III Alfalfa hay	5 lb.	34.0	6.3	
Corn silage (free choice)	60-65 lb.	20.0	23.6	
Total from feeds		54.0	29.9	1.80:1
Monosodium phosphate	4 oz.	0	25.4	
Trace mineral salt	free choice			
Total		54.0	55.3	1.00:1
IV Alfalfa hay	10 lb.	68.0	12.2	
Corn silage	50 lb.	16.8	19.5	
Total from feeds		84.8	31.7	2.67:1
Monosodium phosphate	4 oz.	0	25.4	
Total		84.8	57.1	1.48:1

Minimal daily requirements—Maintenance, 15 grams Ca and 15 grams P, plus 15 grams each during pregnancy (dry period). For lactation, add 1.0 gram Ca and .75 gram P for each pound of milk produced daily.

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