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NUTRITION and Weak Calf Syndrome in Beef Cattle

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Livestock owners in the northwest have been plagued in recent years by large death losses of newborn calves. These deaths have been caused by a condition called "weak calf syndrome". When ordinary methods of treatment and prevention did not control the problem, scientists from the University of Idaho College of Agriculture and other agencies developed an intensive research program to identify causes and determine ways to prevent the syndrome.

As one phase of this research, nutritional programs of 19 beef herds in the Salmon and Challis areas were evaluated during the winter and spring of 1972-73. This study focused on the nutrient contents of the feeds in relationship to the requirements of the cow before and after calving.

All forages fed to the cattle during the winter months were analyzed for protein, phosphorus, calcium and certain other nutrients. For some herds, winter pasture was the major source of forage; others were fed grass or alfalfa hay. The hay and pasture forages had widely varying nutritional quality, depending on plant species and stage of maturity at harvest.

Results of the first year showed that weak calf syndrome was significantly associated with the amount of protein eaten by the cow during the last 60 days of pregnancy.

Table 1. Relationship between protein intake and the incidence of weak calf syndrome in beef cattle herds.*

Crude protein intake	No. of herds	Avg. protein per cow (lb.)	Avg. weak calf syndrome
High (greater that 2 lb./day)	6	2.5	0.6
Medium (1.5 to 2 lb./day)	4	1.8	3.4
Low (less than 1.5 lb./day)	4	1.2	9.8

* The correlation between protein consumption and incidence of weak calf syndrome, - .74, is statistically highly significant (P.01).

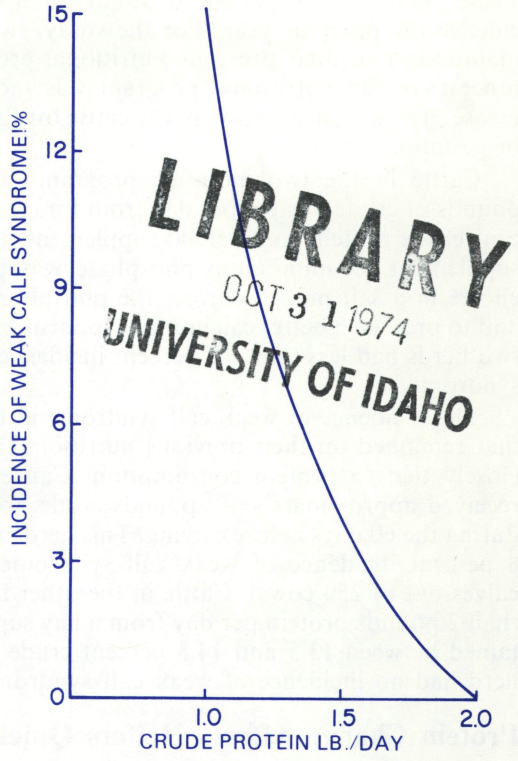

Fig. 1. Incidence of weak calf syndrome in cattle herds consumming varying amounts of crude protein.

When protein intake was 2 pounds per day or more, herds had no problem with weak calf syndrome (Table 1). As the intake of protein dropped below 2 pounds per day, the problem steadily increased. For every 0.1 pound decrease in consumption of protein below 2 pounds per day, the incidence of weak calf syndrome in the herd increased approximately 1 percent (Fig. 1).

In practical terms, these cattle were eating about 20 pounds of forage per day. Those eating hay with more than 10 percent crude protein content had essentially no problems with weak calf syndrome—0.6 percent incidence. Cattle fed hay with less than 10 percent crude protein had serious weak calf problems—an average incidence of 8.5 percent.

Phosphorus and Other Nutrients

Phosphorus levels in all forages were also below the minimum requirements for the cow, but this deficiency was not directly associated with death losses from weak calf syndrome. Most of the herds were fed mineral supplements that were high in calcium and low in phosphorus. Not only did these supplements fail to correct the phosphorus deficiency, but the high calcium level tended to increase the calcium-phosphorus ratio enough to limit the availability of phosphorus to the cow. Therefore, the severity of the phosphorus deficiency was increased.

Other nutrients — magnesium, trace minerals, and vitamin A — were analyzed in the feed and in animal tissues. Although individual deficiencies could be identified, there was no association between these nutrients and the incidence of weak calf syndrome.

Modified Programs Compared

To examine nutritional aspects of the syndrome problem more fully, an intensified study was made in 1973-74 in four herds that had a history of weak calf syndrome. These herds had experienced about an 8.5 percent incidence the previous year. For the study, two herds were maintained on their previous nutritional program; in the other two, the nutritional program was modified to increase protein consumption of the cattle for the last 60 days of gestation.

Cattle in the two modified programs ate at least 2 pounds of crude protein per day from forage and a 38 percent crude protein commercial supplement. In addition, a supplement of ammonium phosphate was provided free choice in a salt mix to correct the phosphorus deficiency and to provide a better calcium-phosphorus balance. These two herds had less than 0.5 percent incidence of weak calf syndrome.

The incidence of weak calf syndrome in the two herds that remained on their previous nutritional program was closely tied to protein consumption. Cattle in one herd received approximately 1.2 pounds crude protein per day during the 60 days before calving. This herd experienced an 8 percent incidence of weak calf syndrome (20 affected calves out of 250 cows). Cattle in the other herd ate more than 2 pounds protein per day from a hay supply that contained between 13.5 and 14.5 percent crude protein. This herd had no incidence of weak calf syndrome.

Protein Change Affects Heifers Quickly

An interesting situation developed among the 320 first-calf heifers of one of the herds on the modified diet. Toward the end of the calving season, the supply of the original high protein forage ran out and a lower protein forage was substituted. The heifers began eating 4 pounds of the lower protein hay (8.3 percent protein) in addition to their winter pasture (3.4 percent protein). At the same time, they refused to eat the commercial protein supplement that had been fed since the beginning of the program. This resulted in a drop of crude protein consumption from 2.0 pounds per day to between 0.8 and 1 pound per day.

Up to that time, none of the heifers had produced calves with the weak calf syndrome. After three weeks on the lower protein diet, the heifers began delivering calves with symptoms of the syndrome. Of the last 50 heifers, 17 gave birth to weak calves.

Young Cows Have Greater Nutritional Stress

Nutrient deficiencies most often occur in first-calf heifers and younger cows since the normal growth processes of these animals demand additional nutrients. This stress of growth, coupled with the need for nutrients by the developing fetus, may result in a nutrient deficiency that could make the developing fetus susceptible to weak calf syndrome.

Approximately two-thirds of the growth of the fetus occurs during the last 90 days of pregnancy (Fig. 2). In the last few weeks before calving, this growth rate approaches 1 pound per day. Most of this fetal growth is tissues composed of protein and minerals. These essential nutrients must be provided by the cow or physiological processes in

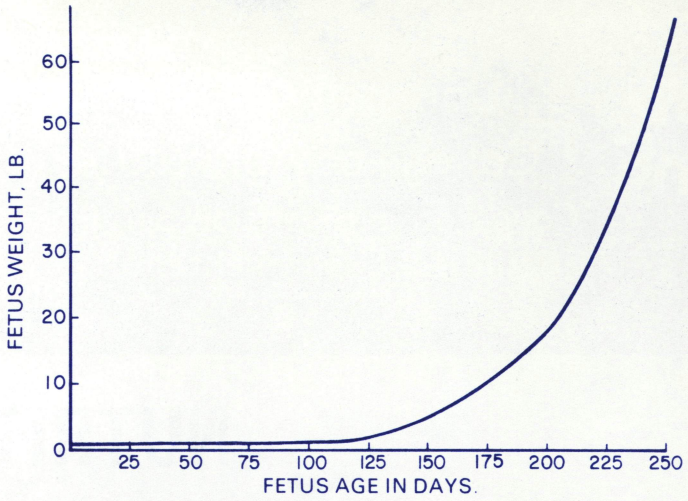

Fig. 2. Prenatal growth of calves.

the unborn calf will be disrupted, leading to nutritional and/or infectious diseases at birth. As protein becomes limited in the cow, certain compounds in the tissues are metabolized and lost. One effect is a decrease of the gamma globulin fraction in the blood. This could account for a loss in calf resistance to infectious agents.

Recommendations

The following nutritional and management practices will significantly aid in preventing weak calf syndrome:

(1) Analyze all feed supplies for nutritional value. Have harvested forages chemically analyzed for crude protein at least. More usable information can be obtained from a chemical "proximate analysis" plus analyses for calcium and phosphorus. These tests will tell ranchers the quality of feed they have, and will pinpoint specific nutrient deficiencies in the forage.

(2) Plan to feed the higher protein forages during the 60 days before calving and during calving. Cows could eat 2 pounds of crude protein per day from forage if it is high enough in quality — 12 percent crude protein or more. To calculate protein intake, multiply percent crude protein in the forage by pounds consumed and divide by 100. Feeding high protein hay during this period before and during calving can mean substantial savings in supplemental protein costs.

(3) Feed a protein supplement when winter pasture or low quality hay is the major source of feed. Forages containing less than 10 percent crude protein will not supply enough protein for the pregnant cow, especially during the 60 days just before calving. Winter pasture on the ranches in this study contained as little as 3.5 percent crude protein. If the cows eat 18.5 pounds of this forage per day, they receive less than 1 pound of total protein and would need from 2 to 2.5 pounds per day of a high quality protein supplement such as soybean meal during the final 60 days of gestation.

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