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Keeping Dairy Calves Healthy

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MANAGEMENT FACTORS INFLUENCING CALF HEALTH

- I. Management practices at time of birth.
 - A. Keep a sanitary calving area, preferably a box stall that is cleaned thoroughly and disinfected between the birth of each calf. Be sure cow's udder is clean prepartum and prior to calf nursing.
 - B. Disinfect the navel with tincture of iodine as soon after birth as possible. If possible, repeat treatment on day 2 and 3 after birth.
 - C. Allow calf to nurse colostrum from dam.
 - D. Place calf in individual stall for at least first 21 days of life. Then place in pen with less than 10 calves of approximately the same age.
- II. Colostrum.
 - A. Early feeding of colostrum—as soon after birth as possible (within the first hour is best), allow calf to nurse dam.
 - 1. Calf is unable to absorb gammaglobulin from colostrum after 24-36 hours.
 - 2. Calf may become infected with highly pathogenic bacteria almost immediately after birth. Colostrum provides protection against these organisms.
 - B. Colostral antibodies fight disease.
 - 1. Newborn calf has no antibodies. Colostrum provides shield against many bacterial and viral diseases.
 - 2. Allows calf to build its own antibodies during first few months of life.
 - C. The antibodies against specific diseases are present in the gammaglobulin portion of the colostrum, and the level of gammaglobulin the calf has in serum is influenced by several factors:
 - 1. Time after birth calf is fed colostrum.
 - 2. Amount of colostrum ingested (6 percent of body weight in first 6 hours after birth) or approximately 2 quarts of colostrum within the first hour after birth for the average to large sized holstein calf.
 - 3. Level of gammaglobulin in the cow's colostrum.
 - 4. Specific antibodies present against a disease, e.g. calf scours.
 - D. It does interfere with our efforts to artificially protect calves. Antibodies from colostrum prevent new ones from developing when the calf is vaccinated.
- III. Navel infections.
 - A. Calf becomes listless and does not eat.
 - B. Animal may have a high fever for a short time but temperature rapidly drops to normal or subnormal.
 - C. Navel cord is usually thickened and is often hot and hard.
- D. Many times these infections are resistant to antibiotic therapy, so they are very difficult to treat. Frequently it is helpful to have your veterinarian get a sample of bacteria from the infected cord and determine which antibiotics will be effective.
- E. Generalized infections commonly develop from the navel cord and spread to the calf's joints. This often results in a debilitated, poor doing calf.

CALF SCOURS

- I. Calf scours—first 10 days of life.
 - A. Usually caused by a bacteria, *E. Coli*, but recently two viruses, a Rota virus and a Corona virus, have been shown to accentuate the disease in many cases.
 - B. Types of scours.
 - 1. *Septicemic type*—characterized by the *E. Coli* organism invading the blood stream of the calf and causing a generalized infection. *Colostrum-deprived* calves usually die of this form of disease. It is so acute there frequently is no evidence of diarrhea.
 - 2. *Enterotoxemic type*—characterized by an acute fatal course, the outstanding clinical features being depression, recumbency, and a subnormal temperature.
 - a. Diarrhea is usually not evident.
 - b. It is caused by the *E. Coli*-releasing toxins in the calf's intestine. These cause severe changes in the calf's fluid and electrolyte balance.
 - 3. *Enteric type*—this is the most common type. Its principal clinical sign is usually a severe diarrhea.
 - a. The calf rapidly becomes weak and dehydrated.
 - b. The calf is usually febrile early in the course of the disease, but its temperature rapidly returns to normal or subnormal readings.
 - C. Treatment.
 - 1. Mild form of scours (calf not off feed, not depressed and no fever), remove the milk or milk replacer and feed only water, glucose, and electrolytes for 3-6 feedings, depending on how soon feces become firm.
 - a. An oral electrolyte solution can be made as follows:

Salt—	4 level teaspoons
Baking Soda—	3 level teaspoons
Glucose—	20 level teaspoons
Water—	1 gallon.
 - b. Feed this at a rate of 10 percent of the calf's body weight per day, i.e. 100 lb. calf would receive 1½ gal. (5 quarts) per day.

OR

 - b. *1 pkg MCP pectin (fruit pectin)
1 tsp. low sodium salt

- 2 tsp sodium bicarbonate (baking soda)
 1 can beef consumme soup
 Add water to the above to a total volume of 2 quarts. Feed 2 quarts to an 80# or heavier calf 2-3 X daily. This formula recommended by Dr. R. D. Phillips and Dr. Lon Lewis, Colorado State University.
 *Pectin is 3 X as effective as corn syrup in raising the blood glucose level.
2. Administer antibiotics orally and systemically for all forms of the disease. The antibiotic found to be most effective against the specific *E. Coli* organism causing disease in a particular herd should be used. The effectiveness of an antibiotic is determined by sensitivity testing. The systemic antibiotics are most important during the systemic form of the disease.
 3. In severe cases, fluids and electrolyte therapy administered intravenously in large quantities often are necessary to save the calf. This may require taking the calf to a veterinarian's office.
- D. Other causes—**infectious agents and dietary.**
1. Other infectious agents.
 - a. Rota virus (Nebraska Calf Diarrhea Virus).
 - b. Adenoviruses.
 - c. Coronavirus—usually later than first 10 days.
 - d. Enterotoxemia due to *C. perfringens* type C. (hemorrhagic enterotoxemia).
 2. Dietary—overfeeding of milk or milk replacers is a primary cause of dietary scours. Usually 8 percent of body weight, i.e. 8 lb. milk per day is adequate for a 100 lb. calf.
- II. Calf scours—11 days to 2 months of age.
- A. Scours at this time in life is usually not too severe in home-raised calves, but can be a real problem in assembled veal calves. In these calves, *Salmonella* is the usual cause of disease.
 - B. Clinical signs of Salmonellosis.
 1. Calves are usually severely affected, have a high fever, and do not drink milk.
 2. Disease persists even though calves are treated extensively with antibiotics.
 3. The feces are often blood tinged, contain mucus and vary in color from gray to a dark brown fluid appearance.
 4. Calves dehydrate excessively.
 5. Complications may develop resulting in the joints, brain, lungs, and liver becoming infected.
 6. Mortality is usually quite high, and many calves become chronic, poor doing calves.
 - C. Treatment usually requires the most intensive antibiotic and fluid therapy available. (See treatment for calf scours first 10 days of life.)
 - D. Other causes and infectious agents that may cause scours during this age period.
 1. Coronavirus.
 2. Bovine virus diarrhea (BVD).
- III. Factors contributing to the development of calf scours.
- A. Failure to feed colostrum early. The importance of the early feeding of colostrum is discussed in Section II, Colostrum under Management Factors Influencing Calf Health.
 - B. Management and environmental factors—Two extremely important categories which contribute to development of disease. Overcrowding or congestion contribute to development of disease. Environmental temperatures, drafts, and improper ventilation have a tremendous influence on development of disease.
 - C. The micro-organisms—These may vary in ability to cause disease. Each herd has its own types of microorganisms so adding new animals may result in introducing new infections and severe disease.
 - D. Nutrition of the calf—Feeding the calf is exceedingly important. Overfeeding may predispose to infectious scours. Inferior quality of milk replacer may contribute to poor digestibility and increase chance of infectious scours. Calf is able to use only milk protein for first 3-4 weeks of life.
 - E. Genetics—Research in this area is needed as some studies suggest differences in susceptibility between breeds and between families within breeds, but the mechanism for resistance is not known.
 - F. Age—Increasing age makes the calf more resistant.
 - G. Nutrition of dam—Low Vitamin A in the dam may increase susceptibility of offspring to diarrhea.
- IV. Points to consider in controlling calf scours.
- A. Management practices.
 1. Cows should be placed in clean maternity stalls prior to parturition.
 2. Avoid congestion in maternity pens.
 3. Be in attendance at parturition.
 4. The udder of the cow should be washed off prior to the calf nursing.
 5. The calf should be assisted to nurse within as short a period of time as possible.
 6. Calves should be placed in individual pens.
 7. To avoid congestion, calf units should be designed as a number of small units.
 8. The facilities should be well ventilated.
 9. Be sure the milk replacer is of high quality and is fed according to directions from the company.
 10. The calf pails have to be scrupulously clean.
 11. Keep same age calves together in a unit.
 12. Avoid all stresses possible and give the calves tender loving care.

- B. Prophylactic use of antibiotics and chemotherapeutic agents.
- C. Immunization.
 - 1. In recent years excellent immunizing agents have been produced, which if administered to the dam prior to parturition produces antibodies in the colostrum, protecting the newborn calf against those specific disease organisms. The disease organisms most frequently involved in neo-natal diarrhea of calves are the coliforms, and Rota and Corona Viruses. Recent research indicates that the K-99 coliform antigen is frequently one of the pathogens isolated in scours of newborn calves. If the Rota or Corona Viruses are also involved, this adds to the severity of the disease. If scours develops in your calves, your veterinarian should be consulted. He will frequently run a culture or send specimens to the Veterinary Diagnostic Laboratory to determine the causative organism and plan a vaccination and health management program accordingly. There is usually no cross-protection from the various vaccines and bacterins. You must use the one, or ones indicated for your herd.
 - 2. Administering serum to the newborn calf appears to be theoretically sound but under practical conditions has not always proved to be highly effective. This method may fail because the antibodies are needed in the intestine to protect against infection and by injecting them under the skin they are unable to get to the lumen of the intestine. The problem of serotypes may be important here, too.

RESPIRATORY DISEASES OF CALVES

- I. Respiratory diseases of calves—Usually seen between the second week and third month of age.
 - A. Management factors involved in the cause of respiratory diseases.
 - 1. Overcrowding.
 - 2. Wide age range of calves grouped in one pen.
 - 3. Poor ventilation—high humidity—high levels of ammonia.
 - 4. Marked variations in barn temperature.
 - 5. Wet, uncleaned, and unsanitary calf pens.
 - 6. Poor quality milk replacers fed during first 3 weeks of life. Calves less than 3 weeks of age perform best on an all milk protein. The protein level should be 20-22%; the fat content, should be a minimum of 10-12%, preferably from animal sources and the crude fiber content not greater than .50%.
 - 7. Unsanitary feeding equipment.
 - B. Microbiologic agents that appear to be important in causing respiratory disease in this age group.
 - 1. Chlamydia—These organisms are between viruses and bacteria in many of their characteristics.
 - a. They were isolated in 4 of 10 outbreaks of calf pneumonia.
 - b. They caused disease when given to young calves.
 - c. They are shed in feces and this may be their main route of transmission between calves and between cows and calves.
 - 2. *Pasteurella hemolytica* and *multocida*. These two bacteria are the most common pathogens of the calf's respiratory tract. They were frequently found along with the chlamydia.
 - a. These bacteria cause obstruction of the airways of the lungs, and when they grow and die, they release a toxin that causes irreparable necrosis of the affected portion of the lungs.
 - b. Early and extensive treatment with antibiotics will prevent the damage described above.
 - 3. Mycoplasma—This micro-organism grows on the surface of cells. It will grow on artificial media, like bacteria if special ingredients are added. Its role in causing respiratory disease in dairy calves still is not defined. Further research studies are needed.
 - 4. Viruses.
 - a. Para-influenza 3 (PI_3). Is found in some calves and causes a mild pneumonia by itself, but can become more severe if the *Pasteurella* organisms are present, and they usually are.
 - 1) Serologically it is found in over 90 percent of Minnesota cattle.
 - 2) Antibodies in colostrum interfere with vaccination prior to 6 months of age.
 - b. Bovine Viral Diarrhea (BVD). In home-raised calves usually not an important problem, but can be serious in some herds especially where new additions have been made.
 - 1) Serologically present in approximately 80 percent of Minnesota cattle.
 - 2) Antibodies from infected dam protect calves from infection and interfere with vaccination until 6 months of age.
 - c. Infectious Bovine Rhinotracheitis (IBR). Not considered to be a serious problem in the home-raised calf under 3 months of age. May develop as problem in herds with new additions.
 - 1) Serologically approximately 40 percent of Minnesota cattle have antibodies against this virus.
 - 2) Antibodies in colostrum interfere with vaccination up to 4-5 months of age.
 - d. Adenoviruses. May be important viral agent in causing pneumonia of calves but this has not been established in Minnesota. This virus also causes some diarrhea and frequently causes marked watering of the eyes.
 - e. Many other viruses including Rhinoviruses, Bovine syncytial virus, Blue Tongue.

C. Clinical signs of pneumonia.

1. Rapid breathing.
2. Difficult breathing—marked movement of ribs and stomach muscles.
3. Cough.
4. Runny nose—First very clear serous then in 2-3 days it becomes yellow, mucus.
5. Fever—temperature 103-106°F.
6. Off feed.
7. Some may show diarrhea.

D. Treatment.

1. Have veterinarian check calves at first signs of disease. Veterinarian may take samples from calves for isolations of the microbiologic agents that are causing disease. To be of value, this has to be done in first 3-5 days after the first cough or runny nose.
2. Intensive antibiotic therapy. Many times it appears to be more effective if the drugs are given in the vein. Therapy duration is important. The minimum time should be 3 days. Best to treat for 5 days. Inadequate treatment results in permanent lung damage and poor doing calves.
3. Calves with marked difficult breathing may be treated by a veterinarian intratracheally with antibiotics and enzymes.
4. Supportive therapy of electrolytes, fluids, and expectorants often is of value in accelerating recovery.

E. Prevention and control—Suggested approaches for prevention of respiratory disease of young dairy calves.

1. Biologics.

- a. Viral vaccines (IBR, BVD and PI₃)—Use of these vaccines appears to be of little or no value in preventing respiratory disease of young dairy calves.
 - 1) The use of the intranasal IBR and PI₃ vaccine in assembled veal calves has been of questionable benefit. There has been a good reduction (30-50 percent) in the clinical signs of both respiratory diseases, but the mortality of vaccinated calves has been 11.8 percent as compared to 7.6 percent in the non-vaccinated calves.
 - 2) The benefits may be more clear cut if the vaccine is used in home-raised, unstressed calves.
- b. The viral vaccines still are recommended for use in healthy calves 4 months of age or older.
- c. Possible reasons for lack of effectiveness of these vaccines include:
 - 1) These specific agents appear to be infrequently involved in respiratory disease problems of young dairy calves.
 - 2) A large percentage of young dairy calves have passive immunity to these agents, thus they do not immunize.
 - 3) Current route of administration may induce a measurable antibody titer, but this has little or no effect on preven-

tion of disease or infection.

- d. Anti-bacterial and viral serum appear to be of little or no value for the following reasons:
 - 1) Low levels of gamma-globulin.
 - 2) In assembled calves, there are a multiplicity of infecting agents, and the serums may not contain antibodies to the infecting sero-types.
2. Environmental factors, warm buildings.
 - a. Have adequate insulation protected by vapor barrier, walls R=15, flat ceiling R=24.
 - b. Provide minimum *continuous* ventilation rate of 4 air changes per hour to remove moisture, odors, and reduce aerosol contamination. $\frac{W \times L \times H}{15}$ = cfm.

Build duct around continuous fan to within 15 inches of floor to remove cooler air. Supplemental heat may be necessary. Summer exhaust should be about 10 times winter rate. Control fans other than continuous with thermostats set between 40 and 50 degrees F. With elevated stalls maintain 55 degree temperature.

- c. Supply uniform fresh air intake with slot inlet, ceiling intakes, or duct system.
- d. Keep calves in individual pens until weaning to prevent direct contact.
- e. Do not overcrowd. Allow about 25 square feet per animal in floor pens. Allow 200 cubic feet of *volume* per animal in the housing unit.
- f. Do not keep older animals, yearlings and beyond in calf barn.
- g. Always locate fans in area occupied by largest animals.
- h. Do not raise calves in the dairy barn with the milking herd or attempt to convert an unused dairy barn into a calf barn.

Refer to *Insulated Calf Barn with Individual and Group Pens*, M-149.

3. Environmental factors, cold buildings

- a. Use individual hutches to provide semi-isolation for newborn calves. After calves are born, move them to hutches as soon as they are dry and have had one feeding of colostrum.
- b. Locate hutches on well-drained site away from barn exhaust fans. Keep hutches at least 4 feet apart to prevent individual contact between animals.
- c. Do not close hutch front in cold weather with the mistaken idea of protecting the calf. Do *increase the ration* to supply more energy.
- d. Vacate and clean hutches between each use.
- e. Calves outgrow hutches at about 2 months of age. Move them to super hutches or other suitable cold building in groups of no more than eight.

- f. At about 5 months calves outgrow super hutches. Then move them to pole or other building with open ridge. Provide tight barrier wall eight feet high to prevent animal contact with next older group. Continue to keep animals in groups having no more than 3 months age difference
- g. Have minimum unobstructed ridge opening of 6 inches. Open side of buildings may need to be closed about 15 feet at each end to prevent draft. Supply continuous ventilation doors in opposite wall. For buildings with all walls closed, supply continuous ventilation openings the full length of both long walls.
- h. Allow enough air movement through building to prevent frost formation on underside of roof. Inside winter temperature should be no more than 10 degrees above the outside temperature.

Refer to *Building and Managing Calf Hutches*, Fact Sheet 24, and *Building a Super Calf Hutch*, M-167.

4. Management factors.

- a. Keep calves less than 6 months old grouped by age with no more than 2 months spread between calves. A 3 month spread in ages of calves grouped together that are 6 months to a year is permissible.
- b. Feed a high quality milk replacer to keep calves at a high plane of nutrition.
- c. Feed calves with individual pail, nipple, bucket or bottle.

SUGGESTED VACCINATION PROGRAMS

- I. The most effective vaccination schedule for your herd is the one designed by your veterinarian who knows the diseases endemic in your herd and in the area.
- II. A possible program may be as follows:
 - A. ***Brucellosis (Bangs) Vaccination**
Vaccinate dairy heifers for Bangs Disease using the reduced dosage vaccine between 4-10 months of age. Vaccination for Bangs and the clostridial diseases, for example, blackleg at approximately 4 months of age is also recommended.
 - B. **IBR and PI₃**
Vaccinate at 4 months of age using the intranasal vaccine.
 - C. **BVD**
Vaccinate at 6-8 months of age.
 - D. Revaccinate all heifers with IBR, BVD, and PI₃ 4-6 weeks prior to breeding. At this time it is advisable to give lepto bacterins if this disease is a problem in the area. There are now five different serotypes of this vaccine.
 - E. All heifers should be revaccinated with IBR, BVD, and PI₃ after their first calving.

*Bangs Disease—the *reduced dosage vaccine* is recommended. The legal limit for vaccination using the reduced dosage vaccine for either dairy or beef heifers is 4-10 months of age. If the standard dose vaccine is used, the legal age is: dairy 2 through 5 months (60-149 days), beef 2 through 7 months (60-209 days).