SYMPOSIUM: Herd Health
Programmed Dairy Herd Health

Abstract

The operation of a dairy herd for maximum profit is based on good feeding, management, records, and a programmed disease control plan. This means that the veterinary practices on a dairy farm must be done at the proper time, at the proper place, and in a coordinated manner to ensure the dairyman the maximum profit and most efficient use of veterinary service. The most important single factor responsible for the rapid recovery of a sick animal is early veterinary diagnosis and treatment.

This program is designed to have each calf born healthy and remain that way throughout its growing and productive life. It enables the high-producing cow to remain relatively free of disease and fulfill inherited potential during each lactation. This type of practice can be accomplished best by the veterinarian making monthly visits to the farm.

A general health program designed to carry out these objectives is discussed for dairy calves, heifers, cows, and bulls. The procedures for prevention and control of reproductive problems are outlined. An Individual Cow Lifetime Health Record Card and Barn Sheet for recording health information are discussed.

The operation of a dairy herd for maximum profit is based on good feeding and management, records, and a programmed disease control plan. This means that the veterinary practices on a dairy farm must be done at the proper time, at the proper place, and in a coordinated manner to ensure the dairyman the maximum profit and most efficient use of veterinary service. The most important single factor responsible for the rapid recovery of a sick animal is early veterinary diagnosis and treatment.

Veterinarian is required to perform this difficult job. The dairyman must provide good husbandry, sanitation, ventilation, nutrition, and keen management. The extension agent and agribusiness personnel must provide the dairyman with information on these key areas. The veterinarian must provide an effective disease prevention and control program that meets the needs and requirements of the particular farm.

This type of practice can be accomplished best by the veterinarian making monthly visits to the farm at a mutually convenient time. Prior to arrival the owner should notify the veterinarian as to the exact nature and quantity of services to be performed. This will enable the veterinarian to allow plenty of time for the work to be done. Then veterinary work can be carried out in a more efficient, organized way, resulting in a saving to the dairyman. At this time the dairyman and veterinarian should also discuss important feeding and management practices helpful in preventing and controlling disease.

Calves

Calves should be born in clean, disinfected maternity stalls. It is important that they receive colostrum for the first three to four days. During this time the calf should be with its mother so that it can drink frequently but not excessively. After separation from the cow it should be fed whole milk twice daily from a clean bottle or bucket in an amount not exceeding 10% of body weight per day for the first months of life. A depressed appetite for 12 to 24 hours prior to diarrhea may be the first visible sign of illness. Dairymen should be alerted to this symptom and secure professional assistance immediately. Daily milk intake should be reduced one-half at the first sign of diarrhea.

After a calf is removed from the cow, it should be housed in an individual dry, draft-
free pen for the first few weeks to prevent sucking. Water should be available at all times to prevent drinking too much at one time. The feed trough and hay rack should be cleaned daily before receiving fresh grain and hay. After weaning, the calf can be moved to a larger pen with five or six calves of comparable size. Scours and pneumonia are prevented by having dairymen follow the above principles. If calves become infected, the importance of prompt diagnosis and treatment is emphasized. Dairymen make the follow-up treatments under the veterinarian’s direction.

In a disease outbreak, it helps to spread out the calves and put them in other barns. It is especially important that newborn calves be isolated from older ones which are carriers of the disease. To control calf septicemia, cows should calve outside in the summer and in a barn or shed away from the infection in the winter. When calf septicemia is a herd problem, an autogeneous bacterin may be advisable. Dry cows receive at least two doses at two-week intervals prior to calving.

Dairymen are cautioned not to use lead paint or leave lead objects where calves can chew on them.

Because of intensive livestock practices in many areas, one must be alert for the presence of parasites in calves and young growing stock. Owners are cautioned against predisposing causes such as lack of proper feeding facilities, crowding, damp environment, and insufficient bedding. Unthrifty stock should be examined for internal or external parasites and treated, if necessary.

An electric dehorner should be used to dehorn calves at two weeks to two months.

Calves are vaccinated for Brucellosis at four to six months, which is the same time to remove supernumerary teats, adding cosmetic and monetary value to the animal and facilitating milking in later life.

In areas where blackleg and malignant edema are present, calves should be vaccinated for these diseases at five to six months of age. The vaccinations for infectious bovine rhinotracheitis and virus diarrhea are given at six to ten months of age.

**Heifers**

It is important that heifers be bred on time. Well-started calves grow up rapidly, and onset of puberty occurs earlier in life; they are ready to breed around 15 months instead of the customary 18 to 20 months. They should be

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1 One kilogram equals 2.205 lb.
should be done at least once yearly. To prevent foot injuries and lameness, herd owners must fill mud holes and remove sharp objects in loafing areas and lanes. When possible a paved loafing area should be provided. A lime box for the cows to walk through at the entrance to the barn is a good idea. It should contain a mixture of hydrated lime, 95 parts, and flowers of sulfur or finely ground copper sulfate, 5 parts. The dairyman should be encouraged to select and breed cattle least predisposed to foot trouble, for example, those with straight pasterns, deep, prominent heels, and toes set close together. On well-managed farms foot trouble occurs most frequently during dry parts of the year when hooves become hard and are easily traumatized by foreign objects.

Brucellosis and tuberculosis testing can usually be handled on a monthly visit. The frequency of testing will depend on the state; however, a herd should be tested at least once a year. Individual testing on show and sale cattle can also be done at the same time.

Milk fever and acetonemia are problems in cows at or after parturition and can usually not be treated on routine visits; however, education of the dairyman makes treatment of these cases possible at a convenient time. Cows with a history of milk fever are sometimes given a calcium preparation subcutaneously, or a vitamin D supplement at the rate of 20 million units per day for three to seven days before calving (1). It is more important for the herdsman to recognize early signs of milk fever and to call a veterinarian before an emergency develops. We urge the herdsman to call at the first signs of the animal’s refusal of feed. Even though a cow’s appetite will likely be depressed at calving time, a cow refusing grain often comes down with milk fever before the next milking. These cows should be milked by removing the pressure in the udder the first day and then gradually removing more milk until they are being milked dry on the third or fourth day. Quarters affected with mastitis should be stripped out at frequent intervals.

There is no effective preventative against acetonemia. High level grain feeding to fresh cows, and early examination and treatment of recently fresh cows that are off feed, are encouraged. Sometimes a feed containing sodium propionate or propylene glycol is of value, especially if it makes up the entire grain ration and the cow becomes accustomed to it before calving. A cow should receive one-fourth to one-half pound of sodium propionate or one-fourth to one-half pint of propylene glycol daily. Palatability can be improved by pelleting the feed and offering it three to four times daily. The addition of cobalt carbonate or sulfate to the ration at the rate of 10 g/ton may be helpful in cobalt-deficient areas. Trace mineralized salt and dicalcium phosphate should be available free choice.

Vaccination Procedures

Frequency and type of vaccination procedures depend on the area and previous history of the herd. Several herds (all animals old enough to go to pasture) are vaccinated for leptospirosis in the spring. These criteria should be used to decide if vaccination is indicated (3): 1) The disease occurs year after year—vaccination should be administered annually to the entire herd two to three weeks before being pastured in the spring. 2) The disease occurs in a herd or in a neighboring herd—prompt vaccination is indicated. 3) Cattle being exhibited or purchased should be vaccinated. If they cannot be isolated from the rest of the herd for two to three months, the entire herd should be vaccinated.

A herd may be vaccinated for hemorrhagic septicemia in the fall, especially if cows are leaving and entering the herd at frequent intervals. The vaccine should contain both Parainfluenza-3 virus and Pasteurella organisms. Some herds with a Staphylococcus mastitis problem should receive a Staphylococcus bacterin monthly for two doses and a booster at six-month intervals. Heifers in these herds should also be vaccinated prior to calving. An autogenous vaccine is sometimes used with good results for chronic mastitis cases. All of these vaccination procedures can usually be handled on monthly visits.

A veterinarian can perform a valuable service for dairymen by checking animals prior to sale or purchase. Health histories should be examined if available, to determine the advisability of purchase and if purchased, to prevent future occurrences of recorded conditions. Animals should be checked for pregnancy, mastitis, and freedom from infectious or contagious diseases. Ringworm, mange, Johne’s disease, cowpox, and some types of mastitis and foot infections frequently enter a herd through newly purchased animals. Selection of cattle with a medical history of mastitis, traumatic gastritis, infertility, and foot trouble should be avoided. It is also important that show and sale animals be isolated from the rest of the livestock for two to four weeks after returning to the farm—whenever space permits. Animals should be transported in disinfected trucks and purchase of new animals...
should be kept to a minimum. If possible, herd replacements should be raised.

**Digestive Problems**

Bloat and other digestive upsets can be prevented to some extent by good management. Changes in feed, frequency, or amount of feeding should be made gradually. When reservation exists about a particular feed it should be tried first on a couple of less valuable animals. Incidence of bloat will be greatly reduced if cattle receive hay prior to being turned on legume pasture. The value of this procedure was well illustrated recently in some drought-stricken areas where dairymen tried to conserve short hay supplies. Fall rains produced luxuriant legume pastures and the incidence of bloat was extremely high in herds when hay was withheld prior to grazing.

Cattle put on high levels of grain too rapidly may have an increased incidence of indigestion and laminitis. Once a cow becomes accustomed to 25 to 30 lb of high energy grain there seems to be little problem. A two- to four-week period is required for rumen flora to adjust to changes in the diet. Heifers and cows should get grain for at least two weeks prior to calving—longer if warranted by their condition.

Traumatic reticulitis can be prevented by keeping nails and wire picked up and storing them in tightly covered containers away from feed. Care should be taken that forage harvesters stay away from fences and loose wire. A magnet in every animal is unnecessary, unless a lot of roughage is being purchased or chopped. Good husbandry and magnets are the key to prevention of traumatic reticulitis.

**Reproductive Health Program**

Effectiveness of a dairy herd health program is based largely on minimizing the incidence of reproductive disorders by having cows, as nearly as possible, on a 12-month calving interval. Although the 12-month interval is ideal, a 13-month interval is more realistic in a well-managed herd, because to maintain a 12-month average some cows would have to calve at a 10- to 11-month interval.

The following reproductive examination schedule is indicated for all cows:

1) Cows that have had a retained placenta should have special attention. They should be examined one to two times prior to breeding to make sure that the uterus is free of apparent infection and is returning to normal size.

2) Cows fresh 30 days should be examined prior to breeding to make sure that the reproductive tract is free of gross infection and undergoing involution at a normal rate. It is much easier to clear up a problem early and it is also less costly to the dairymen. There is a good deal of satisfaction in knowing that a cow is normal and ready to conceive on the first or second service.

3) Cows with an abnormal discharge or cloudy mucus during heat should be examined to determine the source of infection and treated as indicated by the examination. A discharge with a strong odor or one that contains pus is always abnormal. It may be coming from either the uterus, cervix, vagina, or all three areas. If the infection is not localized early by treatment, it can spread to the surrounding areas, making treatment more expensive and recovery more prolonged.

4) Cows with abnormal heats and heat cycles should be examined to determine the nature of the hormonal imbalance.

5) Cows not showing heat 45 to 60 days after calving should be examined so that a normal cycle will be present at breeding time. These cows may not come into heat because their uterus contains several quarts of pus.

6) Cows bred two to three times should be examined to determine the cause of the breeding difficulty.

7) Cows bred 45 to 60 days should be examined for pregnancy. Those done prior to this time should be repeated at 60 to 90 days. The reason for this second examination is that one cow in 10 to 15 will have an abortion during the first 60 days.

**The Bull**

Dairymen are encouraged to use artificial insemination to aid in controlling vibriosis and trichomoniasis. Consideration should be given to the quality control exercised in preparing semen for artificial insemination. To ensure adequate exposure to antibiotics, semen samples should be extended at least 1:25, remaining in the treated extender at least six hours before use as liquid semen. Each milliliter of semen extender should contain at least 500 µg of dihydrostreptomycin and 500 units of penicillin (2). Antibiotics in the extender prevent the spread of vibriosis but not trichomoniasis through artificial insemination. Prior to purchasing semen, dairymen should investigate the 60- to 90-day nonreturn rate of the bull involved, as an indication of his fertility. As a general rule a bull should not be used unless his 60- to 90-day nonreturn rate is at least 60% and preferably 70%.

For natural service, a virgin bull should be used with virgin heifers. To prevent the pos-
sible spread of venereal disease he should not be allowed to come in contact with older bulls. Cows with a history of a vaginal discharge should not be naturally mated. A thorough laboratory evaluation of semen, as well as a physical examination of the bull including palpation of testes and accessory organs, should be done on all bulls prior to entering service (4). The bull's performance during mating should also be observed.

Bulls brought into the herd should be isolated until they are found to be free of tuberculosis, brucellosis, leptospirosis, trichomoniasis, and vibriosis (2).

Diagnostic tests on new bulls should include:
1) Tuberculosis—one intradermal test
2) Brucellosis—one blood test.
3) Leptospirosis—two blood tests at two- to three-week intervals. Bulls exhibiting a high titer on both tests or a rising titer should be kept isolated and treated. After three to four months of isolation they should be retested before entering the herd (2).
4) Trichomoniasis
   a) 8 months or less—no tests
   b) 9-12 months—three tests at weekly intervals
   c) 12 months and over—six tests at weekly intervals
5) Anaplasmosis—complement-fixation test on animals from infected areas.
6) Vibriosis—two naturally mated virgin heifers should be cultured twice between days 35 to 38 and 56 to 59 for a total of four negative cultures on each animal following breeding.

The health status of the herd in which a bull originates should also be investigated. Consideration should be given to the herd's husbandry, history, health status, and breeding efficiency. The individual bull's health history, conformation, condition, conception rate, and performance should also be considered prior to purchase.

The conception rates of all bulls used in a herd should be determined periodically. If a bull's 60- to 90-day nonreturn rate falls below 60% he should be used only under special circumstances. Impaired fertility should be handled as follows (4):

1) The bull should be given a thorough physical examination, with particular emphasis on feet and legs and the reproductive organs. The testes and epididymides should be palpated and the internal reproductive organs examined per rectum.

2) A careful semen collection and evaluation procedure should be used. Attention should be directed toward volume, motility, concentration, and especially morphology of the sample.

3) A single semen sample should not be used as a basis for condemning a bull from a breeding standpoint, since about 50 days are required for maturation of sperm in the testes and epididymis. A bull with temporary infertility may appear normal later.

4) If these procedures do not indicate a reason for poor fertility, one should give special consideration to one of the venereal diseases.

The bull should receive the same husbandry and veterinary attention as the rest of the herd. Exercise, foot care, and diet are areas commonly neglected.

Record System

It is necessary for the dairyman to keep a good set of records for the herd health program to be a success. The system described here consists of Barn Sheet and Individual Cow Life-time Health Record. Although intended to supplement each other, they are quite flexible and may be used either separately or together to fit the needs of individual dairymen.

Individual Cow Life-Time Health Record

This record should be kept on each cow, starting at birth (Fig. 1). In the Cornell Ambulatory Clinic a 21.6- by 27.9-cm² card that fits into a three-ring notebook is used. At the top of the card are the numbers one through twelve indicating the months of the year. Blue, white, and red signal tabs, respectively, are placed over the corresponding number of the month when a cow is examined and found ready to breed; the month of service; and the month due to freshen. The location of these tabs enables the dairyman to determine at a glance the cows due to be dried off in a given month. He is also able to decide quickly which ones to watch closely for heat. Located beneath the numbers is a space to identify the individual and to record all the necessary information to complete a health chart at the time of show or sale. The top half of the front page is for recording the prebreeding examination, estrus, breeding date, sire used, date checked preg-

2 Copies of these records are available from the author.

3 The blank spaces on these cards have been removed in Figures 1 to 4 to save space.
The document is a record of a cow's health and breeding history. It includes the cow's name, birth date, sire, dam, and various health and breeding records over the years. The records are divided into sections for pre-breeding examinations, breeding history, and genital tract exams and treatments. The dairyman analyzes the health records at least once a year to assess the herd's health status and discuss findings with the veterinarian. The Barn Sheet is used to record the work on the farm, including sick animals and their location, to quickly locate sick animals on emergency or routine calls. The Record Analysis section of the document is not fully visible in the provided text.
### General Health Record

<table>
<thead>
<tr>
<th>No</th>
<th>Date</th>
<th>Diagnosis</th>
<th>Symptoms</th>
<th>Treatment</th>
<th>Vaccination Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29/62</td>
<td>Milk Fever</td>
<td>T 100.2, Down</td>
<td>500cc Parcal LV, ITM Uterus</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8/62</td>
<td>Acetonemia</td>
<td>Ketone 4+, TPR Normal</td>
<td>500cc Dextrone LV, Drench</td>
<td>4-17-61</td>
</tr>
<tr>
<td>2</td>
<td>27/63</td>
<td>Milk Fever</td>
<td>T 100.6, Off feed</td>
<td>500cc Parcal LV, ITM Uterus</td>
<td></td>
</tr>
</tbody>
</table>

**FIG. 2.** Back side of health record containing medical history of cow.

### Record of Cows for Monthly Reproductive Examination

<table>
<thead>
<tr>
<th>Date 3-27-63</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cow</th>
<th>Fresh</th>
<th>Estrum</th>
<th>Bred</th>
<th>Pregnant</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova</td>
<td>2-25</td>
<td>3-9</td>
<td></td>
<td></td>
<td>NORMAL O.K. to breed</td>
</tr>
<tr>
<td>Dulcie</td>
<td>11-30</td>
<td>1-6, 1-25</td>
<td>2-14</td>
<td>PRH</td>
<td></td>
</tr>
<tr>
<td>Brilliant</td>
<td>11-8</td>
<td>12-12</td>
<td>1-20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brilliant</td>
<td>12-30</td>
<td>2-10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brilliant</td>
<td>3-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brilliant</td>
<td>3-26</td>
<td></td>
<td></td>
<td>Ovulated Right Ovary</td>
<td></td>
</tr>
<tr>
<td>Brilliant</td>
<td>30cc Furacin infused uterus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FIG. 3.** Front side of barn sheet to record cows due for reproductive examinations.

### Record of Animals

<table>
<thead>
<tr>
<th>Cow</th>
<th>Fresh</th>
<th>Estrum</th>
<th>Bred and Pregnant (P)</th>
<th>Symptoms Noted</th>
<th>Instructed to Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova</td>
<td>2-25</td>
<td>3-9</td>
<td>Off feed this A.M.</td>
<td>Rt. hind quarter hard</td>
<td>Keep stripped out tomorrow Treat quarter in P.M. 17900 Will recheck in 2 days</td>
</tr>
</tbody>
</table>

**FIG. 4.** Back side of barn sheet to record information about sick animals.
already dry. This would be late summer or early fall for many herds. Now is the time to start thinking about preventing the mastitis and breeding trouble that reduced profits during the last lactation. This will enable the high producing cows to get off to a good profitable start at calving this year.

Such information as the calving interval, breeding efficiency from natural and artificial services, number and percentage of cows culled from the herd, reason for culling, replacement cost, cost of purchased cattle, change in inventory, and veterinary costs and return from the veterinary program should be determined. The number of cows and heifers with cystic follicles, retained placentas, calving difficulties, abortions, and those which required three or more services per conception should also be listed.

**Conclusions**

The procedures and recommendations for a dairy herd health plan are discussed. They are designed to have each calf born healthy and remain that way. They enable the cow to produce to her fullest inherited capability and return the greatest possible profit to her owner.

A healthy, profitable dairy herd is maintained by good breeding, feeding, management, records, and programmed preventive medicine. To make this possible, teamwork and good understanding between dairyman, extension agent, agribusiness personnel, and the veterinarian are essential.

**References**


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**Ketosis in Dairy Cattle**

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The primary purpose of this paper is to summarize the current status of the problem of ketosis in dairy cattle, emphasizing the role of the dairyman in its control. An attempt will be made to evaluate present knowledge and make specific recommendations, recognizing that the research data available leave room for differences of opinion.

**Definitions.** Ketosis, or acetonemia, is a metabolic disorder in which the level of ketone bodies in the body fluids is elevated. These ketone bodies are beta-hydroxybutyric acid, acetoacetic acid, and acetone (possibly also isopropanol). This discussion will refer primarily to total ketone bodies, since the proportion of each may vary.

There is good agreement that the presence of some ketone bodies in body fluids is normal; also, that elevation of ketone bodies is a normal consequence of a situation existing when energy needs exceed energy intake and body fat reserves are mobilized. This occurs in fasting or underfeeding, as well as in high-producing cows that may not be able to eat enough to supply the energy needs for high production in early lactation.

It should also be pointed out that ketone bodies are used by many tissues. In the ketogenic cow, there is no major defect in the utilization of ketone bodies, so the problem is primarily one of overproduction. The ketone bodies themselves may not necessarily cause the adverse symptoms, but they do seem to be the best practical indicator of the severity of the problem.

**Incidence.** Ketosis in cattle occurs in practically every area of the world where there are high-producing dairy cows. Some years ago, the incidence in the U.S. was estimated at a million cases per year, or 4% (29). A recent report from the United Kingdom (18) gave a figure of approximately 2%. Incidence in individual herds may be much higher. These figures would obviously be influenced by diagnostic criteria and the extent to which subclinical cases were included. There appear to be no breed or area restrictions on this disorder. The sheep has a similar condition called pregnancy disease, which occurs prior to lambing in ewes carrying twins or triplets. Other farm animals are little, if at all, affected.

Primary ketosis, in the author's experience,