Herd Health Management and Preconditioning

As an outgrowth of discussion and positive planning by the AABP Health Management and Preconditioning Committee, the following three papers were prepared for publication.
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How the Laboratory Can Assist in a Herd Health Plan for Beef Cattle

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The Texas Veterinary Medical Diagnostic Laboratory is interested in herd health plans as it is believed that this type of arrangement will result in the most efficient type of livestock production, yielding a greater net profit for the livestock producer and enabling the veterinarian to serve more ranchers and livestock. The objective of the program is to produce the most product of the highest quality at the least cost.

Under this arrangement the veterinarian makes periodic visits to the ranch, at whatever interval is agreed upon, for the sole purpose of discussing plans for the immediate and long range future. During an early visit goals should be set such as: 365-day calving interval; 63-day breeding season; 95% cows pregnant at eight weeks by pregnancy diagnosis; 92% calving rate of cows bred; 90% calves weaned of cows bred; weight gain birth to weaning (suitable for breed); weight gain weaning to breeding (suitable for breed); and weight at weaning (steers).

Schedules for necessary immunization programs, sterility work and pregnancy examination are made and nutritional supplements and any other other problems with which the veterinarian can assist are also discussed at this time. These might include looking up information on a variety of subjects not necessarily related to veterinary medicine. Consulting with specialists in other fields for pertinent information is a function of the veterinarian in this type of practice.

Essentially what this type of practice does is to add to the staff of the ranch a highly trained individual who becomes closely associated with the operation of the facility and thinks about its problems a great deal of the time while not on the premises.

Part of the service provided is the *sending of literature* on subjects of interest to the ranch personnel. A written report of each visit to the premises detailing subjects discussed and solutions proposed is an excellent procedure. Summary reports at quarterly or semiannual intervals might also be issued.

In order to obtain the greatest benefit from the program the ranch will need to have available certain facilities such as adequate corrals, working chutes, scales, an individual animal identification system and *a suitable record-keeping system.*

In order to suggest ways in which the laboratory can assist herd health programs the *laboratory tests* that can be provided from birth to maturity are listed.

Nursing Period

It is most important that the newborn calf receive *colostrum* as soon as possible, not later than 12 hours following birth and preferably sooner. If circumstances warrant, arrangements can be made to provide frozen or stored colostrum from another cow. It may be necessary to try to identify calves that do not have adequate levels of gamma globulins as the result of not nursing properly or if they seem infection-prone and unable to develop antibodies. Electrophoretic studies or other tests on selected animals might be desirable if it is suspected that calves have not received the protection of adequate colostrum. This condition is being detected with increasing frequency at the laboratory.

If reactions associated with *anaplasmosis vaccination* become a problem, it may be necessary to run a test using the blood cells of the calf against colostral whey. A positive test indicates that the red blood cells are in danger of being destroyed by the intake of colostrum which contains antibodies to the calf's blood type. Cross matching of blood between a cow and the bull to which she was bred or the cow and her

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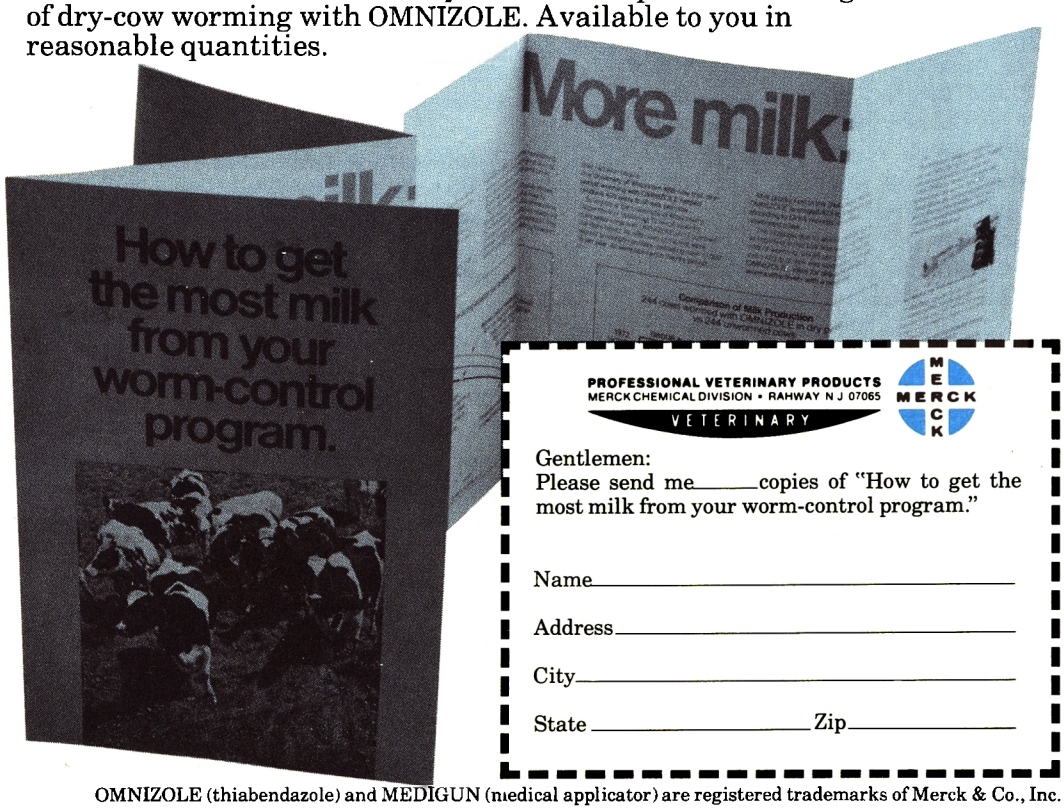

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calf can be done instead but gives many false positive reactions in cow-calf pairs that will not develop the isoerytholysis syndrome.

It is possible to *store colostrum* from several cows and to use that from a cow that does not react with a calf's red cells. This will give the calf colostral antibodies for protection until it is old enough (usually 72 hours) to no longer absorb them. The calf can then be allowed to nurse its mother normally provided she has been milked out completely each day. This procedure may not be entirely safe as reports of calves succumbing after returning to their mothers after five days have been received.

Viral diseases associated with the first few days of life may require identification. In diarrhea cases fresh fecal material taken from the calf within hours of the onset of the diarrhea should be sent to the laboratory frozen or in a plastic bag on adequate amounts of wet ice in order that there will be an opportunity for virus recovery. Viruses associated with early diarrhea include reo, corona, parvo and the bovine virus diarrhea viruses. Some of these can be identified by direct electron microscopic examination. Vaccines, as indicated, should be given at this time. Other viruses found in calves somewhat later include IBR, BVD, PI-3, syncitial and adenoviruses.

Bacterial and fungal diseases can also affect calves during their nursing period. Antibiotic sensitivity tests on significant bacteria recovered from feces or tissues of the calf are invaluable in ascertaining which antibiotics should be effective against the organisms in question, provided sufficiently high antibiotic levels can be developed and maintained long enough to have the desired effect on the invading bacteria. These levels can be determined when indicated, along with levels required for the strains of organisms involved. These bacteria will include *E. Coli* (which is associated with navel ill and bacterial scours), streptococci, pasteurella, corynebacteria, salmonella and clostridial species as well as fungi such as aspergillus, mucor and others.

Calves, being curious as they are, often consume *poisonous substances* that older cattle will avoid. Common poisons in calves as well as older animals include lead, arsenic, insecticides, urea, petroleum products and plants. The *plants* involved vary in different sections of the state and with different times of the year. These plants can be identified in the toxicology department as required. *Seed identification* from ruminal, omasal and abomasal contents can often be helpful in identifying poisonous plants. The identification of alkaloids in ruminal contents and urine is available for certain plants in the toxicology laboratory. Other plant problems may be identified by characteristic clinical chemistries or histopathological investigation. Some cause a clinical picture sufficiently characteristic to be highly suggestive of certain plants or toxins. *Heavy metal poisons* can be detected quantitatively with an atomic absorption spectrophotometer by chemical analyses of body tissues (liver, kidney and blood). *Insecticides* may be demonstrated from ruminal contents. *Urea poisoning* can be confirmed from analyses of frozen blood or frozen rumen content. *Oil or petroleum products* can be demonstrated from contents of the GI tract and at times from the lungs. *Cyanide* can be identified by analysis of muscle placed in one-percent mercuric chloride in the field. For specific information on what specimens are needed for toxins call the laboratory.

Nutrition is one of the most important considerations in health and growth of the calf. The birth weight and pre- and post-weaning gains should be recorded. Adequate energy, protein, minerals and vitamins are required. The laboratory can assist in this area by analyses of feedstuffs and serum. Serum can be analyzed for total protein, calcium, phosphorus, magnesium, sodium, potassium, chloride, iron and copper. The most useful information can be obtained from analyses of the total diet.

Milk replacers should be chosen carefully, if used, in order to be sure there is enough casein or whey present. Vegetable protein is not digested well enough by calves under three weeks of age as their stomach glands do not produce enough acid or pepsin before that age.

In consideration of *parasites, coccidia* are probably the most important internal pests of young calves. Pens must be cleaned or rotated regularly in order to prevent their buildup. When parasites are suspected, fecal material can be sent in individual plastic bags under refrigeration, for parasite egg counts (or viral, bacterial, fungal or protozoal examinations). Nursing calves are less often affected with internal parasites, other than coccidia, than are older animals.

Vaccinations - Marking and Branding Procedures

Vaccination for brucellosis should be accomplished between two and six months of age if the brucellosis vaccination program is used; blackleg vaccination and possibly other clostridia are administered prior to weaning. Other vaccinations that should be considered at marking and branding are: *Clostridium septicum, Cl. novyi, Cl. sordellii, Cl. hemolyticum, Cl. perfringens* type C and D, *Pasteurella multocida* and *P. hemolytica, Leptospira pomona, L. hardjo* and *L. grippotyphosa* and perhaps others such as anthrax, depending on local conditions.

Vaccinations at all ages should be weighed against their cost and the incidence or probability of a disease's occurring in a herd. The program in a closed herd will probably vary from that in a herd with much in-and-out traffic.

In regard to general instructions it should be noted that an animal that has recently died with typical symptoms of a disease affecting the herd is the *best specimen* for submittal to the laboratory. If tissues are submitted for culture, they should be refrigerated (not frozen) before and during transit if transportation will require an interval of more than six hours

between death and arrival at the lab. If *feed* is suspected of causing trouble, about five pounds of it and the feed tag (or a bale of hay) should be brought with the animal for necropsy or specimens from it.

Summary of Laboratory Tests During Calfhood

Serum protein analysis (electrophoresis) or total serum protein;

Coombs test (neonatal isoerythrolysis);

Cross matching bloods or blood and colostral whey (neonatal isoerythrolysis prevention);

Diarrheas: Viral recovery and identification; Bacterial recovery, identification and antibiotic sensitivity tests; Protozoa and parasite identification;

Pneumonias: Viral, bacterial and fungal identification;

Toxicology: Lead, mercury, arsenic, insecticides, urea, fertilizers; Poisonous plant identification plus ergot, nitrate, prussic acid; Serum electrolytes - Na, K, Cl; others: Ca, P, Mg, Cu, Fe, Zn; Serum biochemicals SGOT, CPK, BUN, protein, etc.;

Parasites - egg counts, coccidia identification.

Weaning to Breeding

The weaning procedure is a very stressful time in an animal's life and should be made as easy as possible. Such things as teaching the animals to eat feed prior to weaning, careful roundup with as few "runbacks" as possible, cleaning noxious weeds out of the traps before penning the cattle and assurance of adequate water, feed and bunk space for the animals while in the pen are some of the things required. Of course, the interval in the pens should be kept as brief as possible. Separate cow and calf beyond hearing distance if possible.

Vaccinations during weaning should include a repetition of *Clostridium chauvoei, septicum, novyi, sordellii* and *hemolyticum* (if "redwater" is a problem in the area). It is very important that a second injection of *Pasteurella multocida* and *hemolytica* bacterin be given. If cattle are to go on feed, *Cl. perfringens* types C and D may also be desirable. If leptospirosis is a problem in the area or management practices include an "open" herd, *Leptospira pomona, hardjo* and *grippotyphosa* should also be given.

Consideration should be given to the benefit of developing a "reputation herd" for sending cattle to feedlots. Additionally, consideration should be given to feeding out one's own cattle either at home or at a commercial lot.

Serologic tests can be performed to determine the *serum antibody level* possessed by the animal against the following conditions: *Leptospira pomona, icterohemorrhagia, canicola, hardjo, sejroe, grippotyphosa, hyos* and *autumnalis;* the viruses include bovine virus diarrhea (BVD), parainfluenza-3 (PI-3), bluetongue, parvovirus, adenovirus, reovirus, infectious bovine rinotracheitis (IBR) and vesicular stomatitis. *Bacterial diseases* include vibrio, brucella, hemophilus, chlamydia, salmonella, and Johne's Disease; *protozoan diseases* include piroplasmosis and toxoplasma. Surely no herd will require all of these but the above tests (plus others) are available if needed.

At weaning time calves should be *wormed* and possibly fluked where worm burdens so indicate as determined by fecal examinations for parasite eggs.

Great care should be devoted to selecting *replacement heifers.* Fertility of the dam, gainability of her calves, femininity and conformation of the heifer, pelvis size, udder and teat development are all important considerations.

As has been pointed out by Wiltbank, et. al., there is a high correlation between age and weight, and the *onset of first estrus.* Depending on the breed of the animal, therefore, a weight goal should be set to be attained by a certain age of the animal (usually 14 months) in order that it can be expected to come in heat by that time, conceive and have an early calf. This subject area is very important but outside the scope of this publication. Those interested should see the article by Wiltbank and Faulkner entitled "The Management of Beef Breeding Programs," *The Bovine Practitioner,* No. 5, Page 23, June 1970. In order to bring heifers to the proper weight at the proper age the amount of feed required per head per day can be calculated rather precisely. This varies with different breeds and ranges between 650-750 pounds at 14-15 months of age.

As the *proper weight for age* is so important, nutrition and parasite control are very important during weaning to breeding. Assistance with composition of the ration, fertility of the soil, including soil analyses and fertilization, as well as types of pasture made available, plus supplemental feeding are all part of the herd health program on which advice should be obtained from the appropriate specialist in order to accomplish the rate of gain required for first estrus to occur at about 14 months of age.

During this growing stage, illness or deaths in any of the cattle should be closely investigated if the cause of the disease is not apparent. Appropriate specimens should be collected for shipment to the laboratory.

Management systems should be adopted that will prevent bloat in the animals while on pasture, especially if clover or other legumes are available. If the heifers were vaccinated for brucellosis at older than four to six months of age, it may be advisable, under some circumstances, to run blood tests for brucellosis on them prior to the time they reach 24 months of age. This will detect any persistent reactors from the vaccination and enable them to be eliminated from the herd prior to that time–or possibly detect a brucellosis outbreak. This may prevent vaccination titers being found that could result in the herd being quarantined as a brucellosis reactor herd. Supplemental tests such as the rivanol, heat inactivation, acidified plate antigen and whey agglutina-

tion can also be used to help differentiate vaccination titers.

From weaning on through the remainder of the heifer's life the primary concern is fertility and weaning of an early, heavy calf. A significant portion of the consultant's time should be devoted to this objective.

Laboratory Tests During Weaning to Breeding

Parasite egg counts of fecal samples;

Toxicology - See Calfhood; and

Vaccinate for vibriosis at 12-13 months of age (elective).

Cows

Again, *fertility* is the primary concern and when any of the fertility diseases are suspected, the available serologic tests mentioned above should be employed as indicated. In addition, efforts to obtain the same information by different methods such as bacterial or viral isolation and identification from either the cow or an aborted fetus should be employed. The facilities of the Diagnostic Laboratory in the areas of virology, serology, bacteriology, toxicology or pathology are all valuable aids that should be utilized in an attempt to identify the cause of infertility or abortion problems. All aborted fetuses, if not too decomposed, should be refrigerated (not frozen) and sent to the lab. A portion of the placenta (fresh and fixed) should also be sent along with a serum sample from the cow.

Arrangements should be made with the slaughterhouse to have the genital tracts of cows culled for infertility sent to the laboratory for examination for bacteria, viruses and microscopic changes (histopathology).

Cows are more likely to skip a calf as they become older. Some systems cull a percentage of the cows each year (as 17%) or only allow her to have six calves. In other systems a cow is allowed to stay in the herd until she fails to settle or raises a calf that weans at a substandard weight.

Health problems of other types are also important in keeping cows in good reproductive order and general health. *Nutritional problems* such as hypomagnesemia, calcium and phosphorus imbalance or deficiencies, ketosis, excess copper (poisoning) or deficiency, possibly associated with molybdenum excess, and other deficiencies or poisonings, are all part of the herd health program. The primary thrust is to prevent these conditions and the following is a list of most of the problems encountered in our toxicology and biochemistry area: arsenic, lead, insecticides, urea, mercury, molybdenum, and plants including nitrates, ergot and prussic acid.

Bulls

The selection of sires should be done carefully whether artificial insemination or natural service is used. Many things should be considered and the advice of a geneticist is highly desirable. Fertility of the dam of the bull and his rate of gain are both very important. A performance test to learn the rate of gain of his calves is recommended.

The bull should be examined for fertility prior to being put into service. This should include a *complete* physical exam as well as a semen exam which should include checks for concentration, motility, morphology, live-dead stain and other abnormalities as blood cells, bacteria, etc.

The fertility exam should be done on all bulls prior to being put into service. Between that time and eight years of age it may be done only if it appears the bull is not settling his cows. After eight years of age it should be done annually.

Under some circumstances special care should be taken to protect bulls against anaplasmosis as when a bull is brought into an endemic area.

Regardless of the age or sex, any animal that dies should have an autopsy performed on it in an attempt to ascertain the cause of death (if carcass is found before too decomposed).

First Calving Through Adult Life

Repeat vibrio vaccination annually if a significant potential for infection exists.

Determine antibody levels for any of the following that may be a problem: (Remember, serologic tests only indicate *previous* infection or vaccination in some cases.)

Serology Tests: anaplasmosis, vibriosis, leptospirosis, chlamydiosis, IBR, BVD, PI-3, bluetongue, adenoviruses, Coombs test for isoerythrolysis, parvovirus, brucella, and Johne's Disease.

Tests For Disease Agents: Bacterial disease identification and sensitivity tests; and viral disease identification.

Toxicology Tests: Mg, Ca, P, Cu, Mo, Na, Cl, K, SGOT, CPK, BUN; ketones; glucose; alkaloids; insecticides; nitrate-nitrite; heavy metals; and urea.

Abortion Etiology Tests: Bacterial and viral isolations from fetus: brucella, vibrio, (various "opportunistic" organisms as salmonella, *E. coli,* pasteurella, streptococci, listeria, corynebacterium, etc.), chlamydia, mycoplasma, IBR, bluetongue, BVD, PI-3. Serologic tests should be run on the blood (or other clear body fluid–except stomach fluid) of the fetus and from the aborting cow. These include: IBR, lepto, brucella, vibrio, BVD, PI-3, bluetongue, and vesicular stomatitis.

If the necropsy of the fetus is done locally, send fresh and fixed eyelid, eyeball, tonsil, mediastinal and mesenteric lymph nodes, lung, heart, liver, kidney, spleen, small and large intestine and abomasum and rumen. Thoracic, abdominal and abomasal fluid should be collected with aseptic precautions, especially the latter for culture and serology.