The Clinical Management of Respiratory Disease in Cow-Calf Operations

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Introduction

Undifferentiated bovine respiratory disease (UBRD) in cow-calf operations, with the exception of pulmonary emphysema in newly weaned calves (8), is not considered to be as much of a problem as in feedlots. Usually it occurs in calves after weaning but may occasionally develop prior to weaning. When this happens it is usually associated with late weaning or the "artificial confinement" of range feeding and is often an inducement to weaning because of the difficulties of treating on the range. Clinical management of bovine respiratory disease on the ranch implies a minimum amount of arrivals or "add ons" to the original calves raised on the ranch, therefore minimizing the introduction of new initiators or complicators of respiratory disease (20). Inherent also is the principle that calves will be weaned and sold, back-grounded and sold, or wintered and grazed throughout the following summer to be sold as yearlings. All the variants of this system function in an "all in-all out" fashion, thereby minimizing the pathogens to those carried by the brood cow.

The clinical management of bovine respiratory disease (BRD) in cow-calf operations is aimed at:

(1) preventing the complex disease
(2) treating the disease in a cost-effective way

Prevention of Bovine Respiratory Disease

Minimization of respiratory disease begins early in the life of the calf. An acceptable working hypothesis of BRD (10) suggests that reduction in any one of these three important factors should reduce respiratory disease (Figure 1).

Weaning associated stress, Table 1, can be minimized, Table 2, by spreading out the various stressors. This means that processing of calves with clostridial vaccination, castration and/or growth implanting could initially have been done at the spring roundup. Prior to a determined weaning date, applicable vaccinations, dehorning, parasite control and growth implanting could be brought up to date. If calves have become accustomed to being fed and to watering bowls, the period of adjustment to corral confinement will be considerably reduced. While it is usually accepted that preprocessing calves will reduce the incidence of UBRD, published studies to date don't always substantiate this (1, 6, 12, 13, 14, 15, 20, 23, 24, 25), especially under feedlot conditions. There does seem to be some agreement on a preferred order of processing, however, (Table 3) (10, 12, 14, 22).

Figure 1. A WORKING HYPOTHESIS FOR THE PATHOGENESIS OF UNDIFFERENTIATED BOVINE RESPIRATORY DISEASE

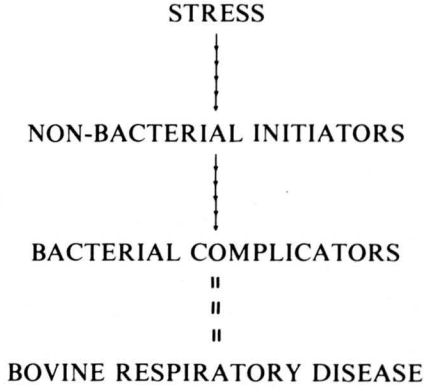


Table 1: Possible Causes of Stress at Weaning

1. Separation, handling, crowding, sorting
2. Physical exhaustion from bawling & walking
3. Irregular feed and water consumption
4. Mixing of cattle in unfamiliar surroundings
5. Shrink
6. Environmental change
7. Processing

Table 2: Management to Minimize Weaning Stress

1. Pre-process calves
2. Feed calves prior to weaning (Bunk break if possible)
3. Introduce heavy feed slowly
4. Minimize market stand
5. Ensure proper handling & transport
6. Provide shelter & bedding
7. Frequent observations

Table 3: Time of Processing in Order of Preference

1. 3-4 weeks prior to weaning
2. At weaning
3. Immediately off truck
4. Within 48 hours of arrival
5. Delayed 2-3 weeks

Prevention of UBRD by vaccination for its initiators like infectious bovine rhinotracheitis (IBR) has generally proved to be ineffective (10, 13). Pre-immunization of calves with modified live virus vaccine, which are subsequently turned back on cows with an uncertain vaccinal history has occasionally created complications (10, 12) and still should not be routinely recommended. Prevention of UBRD with the use of biologics like Pasteurella or other bacterins similarly has in the past been of no success (7, 10, 12, 18).

Table 4: Spreading out Stress

Calving Period	identification
	dehorning (possibly)
Spring Roundup	castration
	initial clostridial immunization
	growth implantation
	branding
	dehorning (possibly)
	other applicable vaccinations
Fall Roundup	(3 weeks prior to weaning)
	booster clostridial immunization (multiple antigen bacterin)
	growth implantation
	initial IBR/PI_3 vaccination (intramuscularly if cow herd immunity is high)
	warble treatment
Weaning	Weaning!

Under the restricted conditions then, of the primary cow-calf producer, the most effective principle to reduce UBRD post weaning is to spread out the management stressors affecting the calves.

Individual Treatment of UBRD

Next to prevention, the most important principle for the clinical management of respiratory disease is early and adequate treatment. Calves usually respond quickly to any of the common antibiotics or chemotherapeutics and often ranchers will indicate that one treatment has been sufficient. The clinician is usually asked to initiate a treatment regime and a system to measure treatment response. The identification of affected cattle and their subsequent method of daily treatment will vary, but should allow for several days' treatment without daily removal from their home pen, Table 5.

The selection of an antimicrobial agent with a short or sustained action will often depend on the treatment facilities available, Table 6. Response to treatment is measured over 48 hours based on (9):

(1) return to a temperature of 39.3°C
(2) reduction in degree of dyspnea
(3) cessation of inappetence and depression

Using this method, treatment is initiated using one drug at a time and response to its use is evaluated on the second day. If the response is favourable the animal is treated a third time

Table 5: Methods of Assessment of Treatment Response in High "Pull Rate" Situations

Unique individual identify & record system
Common pen & day marks
Common pen & temperature mark
Common pen & treatment mark
3-pen system

Table 6: Methods of Individual Treatment

Daily treatment for 3-4 days, assess response daily.
Daily treatment for 2 days, assess response, complete treatment with a sustained action product.
Single treatment with short-acting product & with sustained action, response assessment at "arm's length".
Single treatment with sustained action product. Response assessment at "arm's length".

and sent "home". If the response is unfavourable a second drug is substituted, is added, the route of administration is changed or the dosage or frequency of administration is increased. The amount of record keeping necessary to glean this information will vary from ranch to ranch.

Crude response rates for specific antimicrobials can then be calculated and their effectiveness analyzed. In our experience the common antibiotics have provided us with the most favourable response rate at least cost. This has been especially true when the usual recommended dosages are increased. With increased volumes at the higher dosages, the use of the subcutaneous route provides a welcome relief from the muscle necrosis associated with prolonged intramuscular treatment. In the cow-calf situation, supportive therapy probably has little value other than in cases of severe dyspnea (3, 9).

Treatment failures still occur and the most common reasons for these failures are presented in Table 6. Necropsy information is essential to assess whether the treatment failure is due to one of the outlined causes, Table 7. A necropsy examination should not only confirm the pathological cause of death, but also establish where in the management of the affected calf the treatment system failed and allowed the mortality to occur (4).

Testing the sensitivity of the causative organism, usually *Pasteurella hemolytica,* from necropsied calves frequently reveals a resistance to the antimicrobials with which the calf was treated. Therefore, using these test results has less value than using pretreatment sensitivities in planning the treatment protocol.

Table 7: Reasons for Treatment Failure

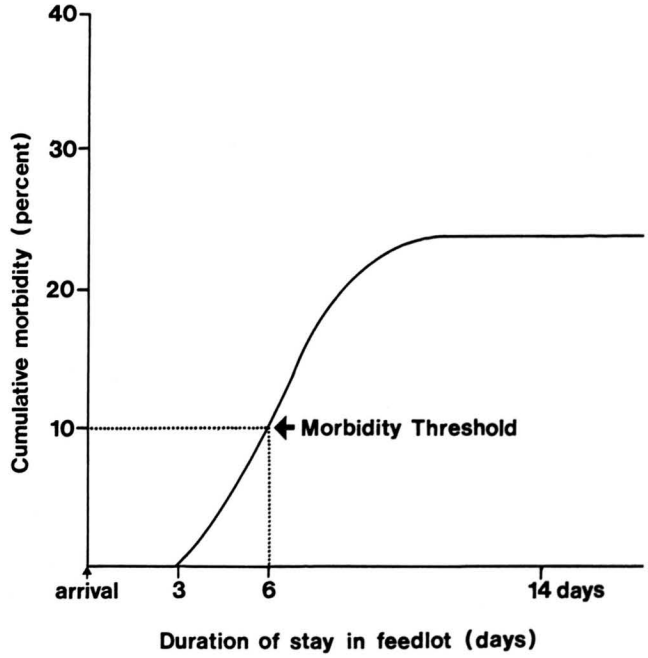
1. Wrong or incomplete diagnosis
2. Pathology of lesion too far advanced
3. Inadequate dosage or route
4. Antibiotic resistance
5. Other compounding factors

Control of UBRD by Mass Medication

Producers often routinely mass medicate their calves from weaning until calves have adjusted to the feeding period to effectively prevent UBRD or Haemophilosis (17, 21). This may be especially indicated when weaning occurs during inclement weather, late in the season. With late November or early December there is an increased risk of Haemophilosis occurring. When many processing procedures are associated with weaning at this time, this may further indicate the prophylactic use of mass medication. In the ranch situation where specific groups of calves may be medicated only once yearly, there is little opportunity for newly resistant strains to cycle back into newly arrived cattle as in the feedlot situation. Therefore, if facilities and personnel for treating sick calves are restricted, selective mass medication of ranch calves is often indicated.

FIGURE 2

Use of cumulative morbidity of undifferentiated bovine respiratory disease and duration of stay to initiate medication



"Wreck" Management

Occasionally the morbidity in a group of calves will rise too high for the capability of a particular rancher and from then on is referred to by him as a "wreck". By definition, a "wreck" occurs when an excessive pull rate occurs in a defined period of time, Figure 2. Both criteria vary with the situation, but under feedlot conditions, we might consider a cumulative morbitity of 20% over 10 days, a "wreck". A rapidly escalating "pull rate" can only be curtailed by various methods of mass medication, Table 8. The rationale is that mass medication would treat these incubating the disease and those mildly affected (2).

While the use of mass medication to abort an outbreak of UBRD is successfully used by clinicians in everyday practice (11), it is most often studied as a method of preventing UBRD (16, 17, 18, 19, 21). Therefore, selection of method used will more often be determined by circumstances than by

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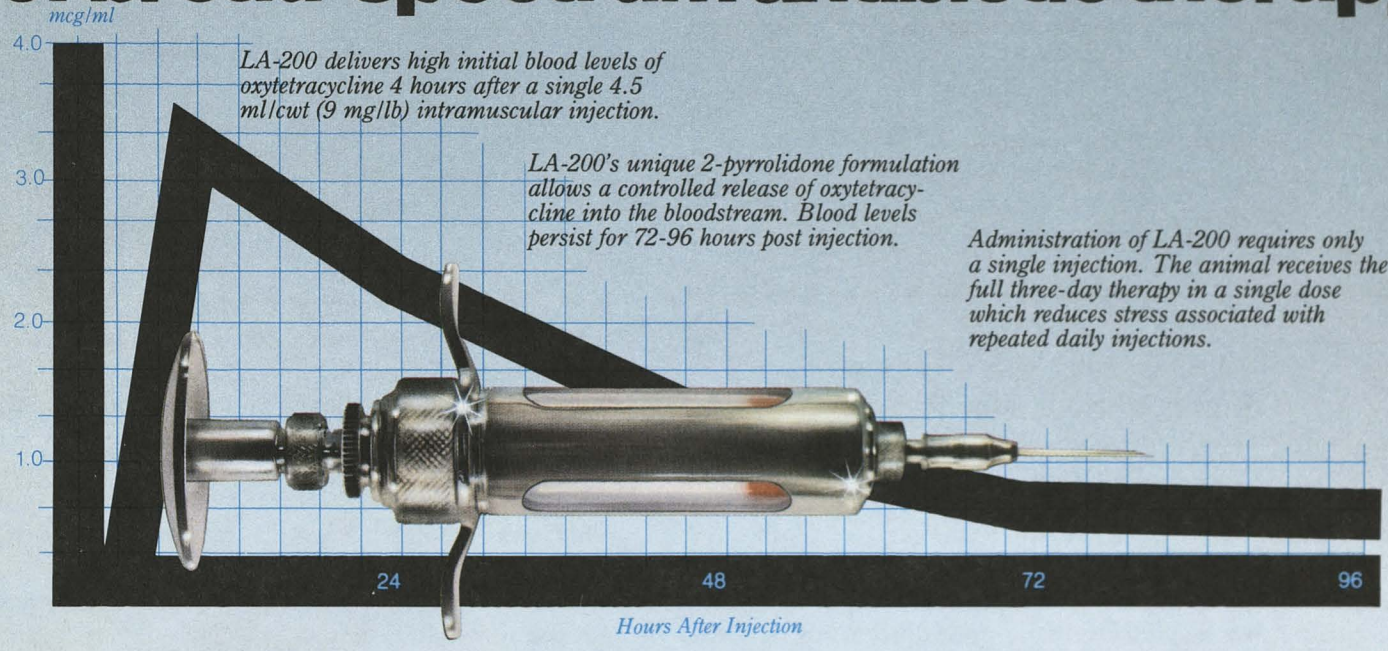


LIQUAMYCIN® LA-200™ (oxytetracycline injection)

Before prescribing, see package insert for full product information, a brief summary of which follows.

INDICATIONS: Liquamycin LA-200 is intended for use in treatment of the following diseases in beef cattle, nonlactating dairy cattle and swine when caused or complicated by susceptible organisms:

CATTLE: Pneumonia and shipping fever complex, foot-rot, diptheria, bacterial enteritis (scours) wooden tongue, leptospirosis, anaplasmosis, anthrax, wound infections, and acute metritis.

SWINE: Bacterial enteritis (scours, colibacillosis) pneumonia, and leptospirosis.

In sows, Liquamycin LA-200 is indicated as an aid in control of infectious enteritis (baby pig scours, colibacillosis) in suckling pigs.

WARNING: Discontinue treatment at least 28 days prior to slaughter of cattle and swine. Not for use in lactating dairy animals.

PRECAUTIONS: Exceeding the highest recommended level of drug per pound of body weight per day, administering more than the recommended number of treatments, and/or exceeding 10 ml intramuscularly per injection site in adult cattle and 5 ml intramuscularly per injection site in adult swine, may result in antibiotic residues beyond the withdrawal period.

Reactions of an allergic or anaphylactic nature, sometimes fatal, have been known to occur in hypersensitive animals following injection of oxytetracycline. Should such reactions occur, discontinue treatment with Liquamycin LA-200 and consider the administration of epinephrine, antihistamines, and/or corticosteroids, as the conditions may warrant.

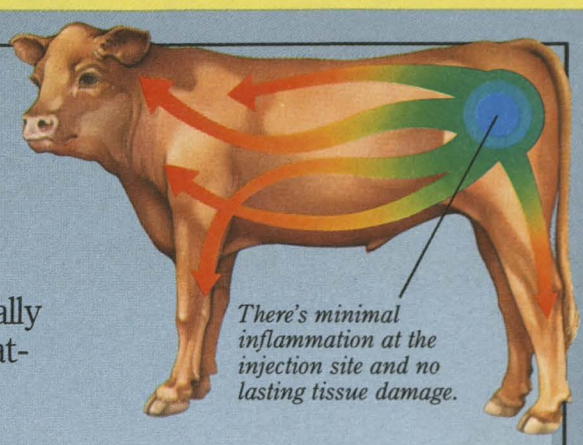
Shortly after injection, treated animals may have transient hemoglobinuria resulting in darkened urine.

As with all antibiotic preparations, use of this drug may result in overgrowth of nonsusceptible organisms, including fungi. The absence of a favorable response following treatment, or the development of new signs may suggest an overgrowth of nonsusceptible organisms. If any of these conditions occur, the use of this product should be discontinued and appropriate specific therapy should be instituted.

Since bacteriostatic drugs may interfere with the bactericidal action of penicillin, it is advisable to avoid giving Liquamycin LA-200 in conjunction with penicillin.

DOSAGE AND ADMINISTRATION:

CATTLE: Liquamycin LA-200 (oxytetracycline injection) is to be administered by intramuscular or intravenous injection to beef cattle and nonlactating dairy cattle at a level of 3 to 5 milligrams of oxytetracycline per pound of body weight per day. In treatment of anaplasmosis, severe foot-rot and advanced cases of other



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ndicated diseases, a dosage level of 5 milligrams per pound of body weight is recommended.

A single dosage of 9 milligrams of oxytetracycline per pound of body weight administered *intramuscularly* is recommended in the treatment of anaplasmosis where retreatment is impractical due to husbandry conditions, such as cattle on range, or where repeated restraint is inadvisable.

SWINE: In swine, Liquamycin LA-200 is to be administered by intramuscular injection at a level of 3 to 5 milligrams of oxytetracycline per pound of body weight per day.

For sows, administer once intramuscularly milligrams of oxytetracycline per pound of body weight approximately 8 hours before farrowing or immediately after completion of farrowing.

For swine weighing 25 lbs of body weight and under, it is recommended that Liquamycin LA-200 be diluted and administered as follows: Volume of Diluted Liquamycin LA-200

Body Weight	Dilution*	3 mg/lb	5 mg/lb
5 lb	1:7	0.6 ml	1.0 ml
10 lb	1:5	0.9 ml	1.5 ml
25 lb	1:3	1.5 ml	2.5 ml

*To prepare dilutions, add one part Liquamycin LA-200 to three, five or seven parts of sterile water, or 5 percent dextrose solution as indicated; the diluted product should be used immediately.

Treatment of cattle and swine should be continued 24 to 48 hours following remission of disease signs; however, not to exceed a total of four consecutive days. If improvement is not noted within 24 to 48 hours of the beginning of treatment, diagnosis and therapy should be re-evaluated.

When the intramuscular route is used, no more than 10 ml should be injected at any one site in adult cattle, and not more than 5 ml per site in adult swine. The volume administered per injection site should be reduced according to age and body size so that 1 to 2 ml per site is injected in small calves. Intramuscular injections should be made well within the fleshy part of heavy muscles, such as are found in the gluteal region of beef cattle, nonlactating dairy cattle, and swine. Injections should be made into properly selected anatomical locations as a precaution against inadvertent injection into or near a major nerve; rotating injection sites for each succeeding treatment is recommended. As with all highly concentrated materials, Liquamycin LA-200 should be administered *slowly* when used by the intravenous route.

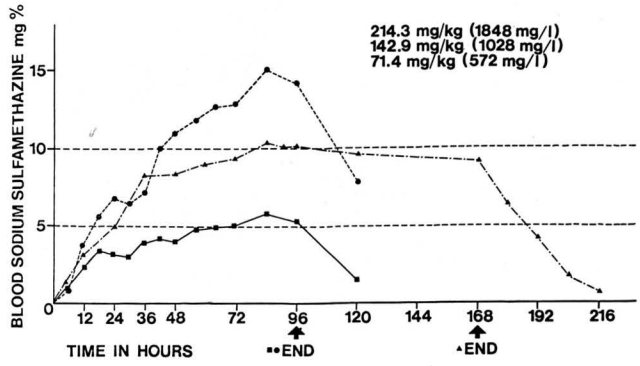
CAUTION: FEDERAL LAW RESTRICTS THIS DRUG TO USE BY OR ON THE ORDER OF A LICENSED VETERINARIAN.

Table 8: Methods of Mass Medication

1. Mass one-time individual medication
2. Mass individual medication for 3 subsequent days
3. Chemotherapeutics in the water
4. Chemotherapeutics in the feed

judgement based on precise information. Delivery of chemotherapeutics to calves who are inappetent or whose consumption of water is reduced is unreliable. Therapeutic blood levels (5 mg/dl) of sulfamethazine have been attained in healthy calves (Figure 3) when drinking water with a low concentration of the drug (5), but whether these levels are obtained in a pen where the incidence of UBRD is escalating is usually based on the observed favourable response. Ensuring the delivery of the correct dosage may be further complicated on some ranches by unreliable water proportioners or inadequate mixing equipment.

FIGURE 3: Blood Levels of Sodium Sulfamethazine Attained by Orally Medicating Calves at Three Different Levels Over Time.



Mass individual medication has been reported to abort an outbreak (11) or prevent cases from occurring (16, 18). In situations where cattle are anorexic or water medication is not feasible, mass treatment of all individuals in a pen is an alternative. This can be done with somewhat increased precision if only calves with a temperature greater than 39.5 are injected.

Conclusions

Undifferentiated bovine respiratory disease (UBRD) in cow-calf operations does not usually occur with the same frequency as in the feedlot situation. On ranches, calves are usually from a single source and often the most successful procedures to control UBRD are; spreading out processing stress and preventive medication. Although infrequently, excessive morbidity and its associated mortality do occur on ranches. Minimization of these "wrecks" should be aimed at the alternative methods of mass medication.

Bibliography

1. Andrews, A. H. Factors affecting the incidence of pneumonia in growing bulls. Vet. Rec., 98: 146-149. 1976. - 2. Blood, D. C., J. A. Henderson and O. M. Radostits. Veterinary Medicine, Fifth Edition, pp 492-496. London: Baillière Tindall. 1979. - 3. Christie, B. M., R. E. Pierson, P. M. Braddy, D. E. Flack, D. P. Horton, R. Jensen, E. A. Lee, E. E. Remmenga, K. G. Rutt. Efficacy of Cortico-steriods supportive therapy for bronchial pneumonia in yearling feedlot cattle. Bov. Pract., 12: 115-117. 1977. - 4. Church, T. L. Preventive medicine and management in beef feedlots. Can. Vet. J., 21: 214-218. 1980. - 5. Church, T. L., E. D. Janzen, C. S. Sisodia and O. M. Radostits. Blood levels of Sulfamethazine achieved in beef calves on medicated drinking water. Can. Vet. J., 20: 41-44, 1979. - 6. Curtis, R. A. and T. D. Burgess. Reception procedures for feedlot cattle. Abstract. Can. Vet. J., 19: 326. 1978. - 7. Harris, W. F. Are the licensed bovine bacterins effective? Should formulas be changed? JAVMA, 163: 841-842. 1973. - 8. Hibbs, C. M. Pulmonary emphysema in newly weaned calves. Proc. 11th AABP convention, pp 125-128. 1978. - 9. Hjerpe, C. A. and T. A. Routen. Practical and theoretical considerations concerning treatment of bacterial pneumonia in feedlot cattle with special reference to antimicrobic therapy. Proc. 9th AABP convention, pp 97-140. 1976. - 10. Hoerlein, A. B. Preconditioning of beef cattle. JAVMA, 163: 825-827. 1973. - 11. Janzen, E. D. and R. F. McManus. Observations on the use of a long-acting oxytetracycline for in-contact prophylaxis of undifferentiated bovine respiratory disease in feedlot steers under Canadian conditions. Bov. Pract., 15: 87-90. 1980. - 12. Kahrs, R. F. Rational basis for an immunization program against the common diseases of the bovine respiratory tract. Can. Vet. J., 15: 252-256. 1974. - 13. Kiesel, G. K., C. R. Rossi, H. D. Alexander and G. G. Brooks. A study of weaning, acclimatization and limited vaccination on the incidence of respiratory disease complex in cattle. Cornell Vet., 62: 454-463. 1972. - 14. Knight, A. P., R. E. Pierson, A. B. Hoerlein, J. H. Collier, D. P. Horton, J. B. Pruett. Effect of vaccination time on morbidity, mortality and weight gains of feeder calves. JAVMA, 161: 45-48. 1972. - 15. Lofgreen, G. P., D. G. Addis, J. R. Dunbar and J. G. Clark. Time of processing calves subjected to marketing and shipping stress. J. Anim. Sci., 47: 1324-1328. 1978. - 16. Lofgreen, G. P., L. H. Stinocher and H. E. Kiesling. Effects of dietary energy, free-choice alfalfa hay and mass medication on calves subjected to marketing and shipping stresses. J. Anim. Sci., 50: 590-596. 1980. - 17. Perry, T. W., W. M. Beeson, M. T. Muohler and R. B. Harrington. Value of chlortetracycline and sulfamethazine for conditioning feeder cattle after transit. J. Anim. Sci., 32: 137-140. 1971. - 18. Schipper, I. A. and C. L. Kelling. Shipping fever prophylaxis: Comparison of vaccine and antibiotics administered following weaning. Can. Vet. J., 12: 172-175. 1971. - 19. Swift, B. L. and J. W. Settlemire, Jr. The prophylactic use of chlortetracycline for the prevention of respiratory disease in weaned beef calves. University of Wyoming Agriculture Experiment Station Research Journal, No. 86. October, 1974. - 20. Wieringa, F. L., R. A. Curtis and R. A. Willoughby. The influence of preconditioning on plasma corticosteriod levels, rectal temperatures and the incidence of shipping fever in beef calves. Can. Vet. J., 17: 280-286. 1976. - 21. Woods, G. T., M. E. Mansfield and G. F. Cmarik. Effect of certain biologic and antibacterial agents on development of acute respiratory tract disease in weaned beef calves. JAVMA, 162: 974-978. 1973. - 22. Woods, G. T., M. E. Mansfield, G. F. Cmarik, G. Marquis. A four-year clinical and serologic study of the use of inactivated parainfluenza-3 virus vaccines and *Pasteurella* sp. bacterins in beef calves. Vet. Med./Small Anim. Clin. 69: 474-478. 1974. - 23. Woods, G. T., M. E. Mansfield and Joan Krone. A controlled field study using live virus vaccines and an antiserum in a preconditioning program. Can. J. Comp. Med., 36: 12-16. 1972. - 24. Woods, G. T., M. E. Mansfield and R. J. Webb. A three-year comparison of acute respiratory disease, shrink and weight gain in preconditioned and non-preconditioned Illinois beef calves sold at the same auction and mixed in a feedlot. Can. J. Comp. Med., 37: 249-255. 1973. - 25. Zweiacher, E. R., R. M. Durham, B. D. Boren and C. T. Gaskins. Effects of method and time of castration of feeder calves. J. Anim. Sci., 49: 5-9. 1979.