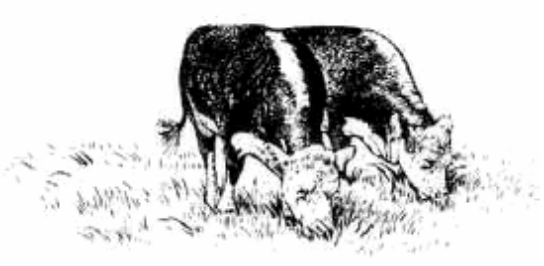
Feeder Calf Management for Successful Marketing



Lesson 1

Introduction

Cattle are placed in feedlots or on grass with the goal of making a reasonable profit, while producing a quality consumer product. Profitability of the feedlot/stocker business is generally greatest when the animals gain weight efficiently and reach the terminal weight in the shortest time period. A quality product is the combined result of genetics, feeding, health, and handling.

Health in the feedlot plays a vital role in animal performance, profitability, and providing a high quality product to consumers. It has been said that the best way to ensure that feedlot cattle will be healthy is to buy healthy cattle. Thus, feedlot health management begins with the cow-calf producer. Remember, health management is primarily disease prevention, combined with protocols for treating individual sick animals when necessary.

This lesson of the Value Based Marketing home study course discusses feedlot health program goals, pre-feedlot calf health programs, health protocols for receiving and treating feedlot cattle, and examine the importance of beef quality assurance.

Feedlot Health Program Goals

A feedlot health program should be one of the strategies for accomplishing the interdependent objectives of making a profit, and producing a quality product. A suggested list of goals may include the following (Church, 1980):

1. Rapid growth rate, minimal fat at an acceptable slaughter weight, and optimum size at maturity. This is achieved by purchasing cattle with the genetic potential for rapid growth and leanness.

2. Maximization of feed conversion efficiency by formulation of least-cost rations, effective feeding techniques, effective parasite control, the use of growth promotants, and the culling of animals with chronic diseases that are refractory to treatment.

3. Reduction in morbidity, mortality, and culling rates in the following ways:
    - the purchase of cattle in good health by cattle buyers who know what they are buying
    - an effective processing and introductory system that minimizes the incidence of disease
    - animal attendants who can detect and treat clinically affected animals in the early stages of disease
    - a reliable record-keeping system using a computer that provides useful information on a daily basis
    - a simple protocol for the clinical management of sick cattle

4. Optimization of expenditures for biologicals and antimicrobials used for the control and treatment of disease.
    - avoiding unnecessary use of vaccines, anthelmintics, and prophylactic antimicrobials
    - treating sick animals as early as possible with the most cost-effective drugs
    - using long-acting antimicrobials when the morbidity rate in a new pen of cattle is increasing
    - monitoring treatment response and relapse rate and making appropriate changes in treatment protocol
    - avoiding unnecessary treatment
    - educating animal attendants on the proper use of vaccines and drugs used in the feedlot
    - identifying refractory cases early, discontinuing treatment, and culling the identified animals

5. Maintenance and improvement of employee motivation to provide good animal management and early detection and treatment of sick animals. Animal attendants must be made to feel that they are part of an important team providing animal health care. Such care should be evaluated regularly and the results shared. Education and communication is vital.

6. A profit commensurate with other investment opportunities. Know the preferred degree of risk aversion and adjust management accordingly.

7. The production of wholesome beef free of chemical residues.
    - reliable individual animal identification
    - reliable record-keeping and cross-referencing before shipment
    - no extra-label drug use after a certain body weight
    - the use of drugs with a short withdrawal period on animals near slaughter weight

With objectives similar to the list above, it is clear that there is a strong interrelation between health status, handling of cattle, feedstuffs, facilities, and management of operation. Success is dependent on all of these factors. Overlooking any one of the factors could spell disaster.

Pre-Feedlot Calf Health Programs

A survey conducted by Cattle-Fax in 1995 indicated that buyers were more willing to buy and pay premiums for calves that had been weaned and those that had been vaccinated. Many feedlot operators today will not bid on calves that have not been vaccinated before the sale.

However, for a cow-calf producer, the decision to process calves and/or wean before sale time must also be based on economics. Prices paid for calves that have been weaned or pre-processed must at least pay for the investments in vaccines, feeds, and labor. Producers must also weigh the benefits of future sales based on current health protocol.

Medicine, feed and labor costs vary for each operation. Table 1 lists medicine and feed cost ranges and totals (based on averaged costs). Using this procedure, it is demonstrated that producers can cover their costs if they are paid an additional $1.18 to $3.21/cwt. for calves that were pre-weaned and/or pre-processed. Hogan and Gutierrez report similar results in the referenced article.

Table 1. Determination of additional price to be received for a weaned and/or processed 550-lb. calf.

Expense	Weaned 21 days	Health processed	Weaned 21 days, health processed
Medicine, $/day	0.0	4 to 9	4 to 10
Feed, $/day	.36 to .70	0.0	.36 to .70
Total [a], $	11.13	6.50	17.63
Additional price, $/cwt	2.02	1.18	3.21

[a] At average feed and health processing cost.

An extensive series of studies tracked prices of calves sold through Superior Livestock video auctions. Transactions tracked involved calves that had been enrolled in one of various programs that defined pre-weaning vaccinations or procedures (King et al., 1996, 1997; King, 1997).

Data from 5,092 lots of calves sold between June and October of the years 1995 through 1997 were included. As a reference point, transactions were also tracked involving calves that had not been pre-conditioned, or vaccinated against viral diseases at least one time between birth and date of shipment. Table 2 lists price differentials for lots that were managed differently.

Vaccinating calves at branding or pasture turnout with a 7-way clostridial vaccine, and then against viral diseases 3 to 4 weeks prior to weaning resulted in positive differentials ranging from $.99 to $1.60/cwt. in favor of pre-processed calves (Vac 34). Vaccinating against viral and clostridial diseases at 2 to 4 months of age, followed by another viral vaccination 3 to 4 weeks prior to weaning, and weaning at least 45 days prior to shipment resulted in positive differentials ranging from $2.47 to $3.24/cwt. in favor of pre-conditioned calves (Vac 45). Unweighted averages revealed that price differentials given to calves that were pre-processed (Vac 34), or pre-conditioned (Vac 45) were well within the range of

differentials required to cover feed and vaccination costs (see Table 1 and 2). The differential between calves that had been vaccinated against one or more viral diseases sometime between birth and date of shipment and those that were not pre-processed supports results of the 1995 Cattle-Fax buyer survey, confirming the importance of pre-weaning health programs.

Table 2. Price differentials ($/cwt.) for calves sold through Superior Livestock Auction between 1995 and 1997 [a].

	Differential between no vaccination and			Differential between
Year	Virus vaccination [b]	Vac 34	Vac 45	Vac 34 and Vac 45
1995	.70	1.35	2.47	1.12
1996	.43	.99	3.35	2.36
1997	.72	1.60	3.89	2.29
Average [c]	.62	1.31	3.24	1.92

[a] Adapted from data by King et al. (1996, 1997) and King (1997). All comparisons were different ($P < .05$). Programs varied in complexity with Vac 34 being less extensive than Vac 45. See 1999 MN Cow/Calf Report pg.12 for more details.
[b] A vaccination against one or more viral diseases between birth and date of shipment.
[c] Unweighted average.

Developing a Herd Health Protocol

The health of cattle is most vulnerable during the period after arrival in a new environment. It is at this time that a combination of animal husbandry and animal science brings the greatest success. The Oklahoma fact sheet on stocker cattle listed in the lesson references suggests that before ordering cattle, these three rules must be considered:

1. Don't receive cattle unless 14 straight days can be devoted to them.
2. Don't let the quantity exceed the capacity of the crew.
3. Be prepared to handle and work all calves.

When developing a protocol, it is important to evaluate the stress level of the animals, which you will be handling. In the paper “Tailoring Receiving Health Programs to Feeder Cattle Origin,” developed by Dr. Trevor Ames (Appendix A), the types of cattle are broken down into four categories depending on their risk level. In determining "risk", there are several items to consider. These include things such as origin (sale barn vs. off-farm), co-mingled, travel distance, temperament, age, previous health program, weather, nutritional status, population density and competition, comfort, and handling.

Once the animals have been categorized, Dr. Ames also includes several potential protocols. These should be used only as examples. It is vital to take the time to sit down with a veterinarian in developing a specific protocol.

In addition to the typical arrival processing, it is also advised to treat sick animals (visually observed, and/or body temperature above 104° F). The objective of sick animal protocols is to treat the animal in

an ordered sequence, trying several products if necessary, until the animal responds to the treatment. The sick animals should be sorted out to recuperate and avoid contamination of the rest of the group.

In nearly all cases, it is recommended to rest the animals 12-24 hours before handling them. Be sure to have all the necessary products on hand. **Always read the product labels and administer accordingly, with all injectables in the neck.**

Items to Address in Protocol

Respiratory Diseases
- Viral
  - (IBR) Infectious Bovine Rhinotrachuties
  - (BVD) Bovine Viral Diarrhea virus
  - (BRSV) Bovine Respiratory Syncytial virus
  - (PI_3) Para Influenza$_3$ virus
- Bacterial
  - Pasteurella haemolytica
  - Pasteurella multoeida
  - Haemophilus sommus
  - Mycoplasma

Clostridial Disease
- Muscle
  - Blackleg
  - Maligrant edema
  - Sord
- Liver
  - Black disease
  - Red waler
- Intestinal
  - Overeating disease (entrotoxemia)
  - Purple gut
  - Cl. sordellii

Parasites
- Grub control
- Lice control
- Coccidia
- Round worms
- Liver flukes
- Tape worms
- Biting and non-biting flies

Other Diseases
- Leptospirosis
- Diarrhea
- Achidosis
- Bloat
- Foot rot
- Pinkeye
- Calf diphtheria
- Implanting
- Dehorning
- Castrating
- Identification

Animal Handling

Animal handling also plays a factor in how well the animals perform as well as the quality of product produced. Dr. Temple Grandin has researched this topic extensively and described several items in an article titled, "Handling Methods and Facilities to Reduce Stress on Cattle."

She suggested several topics to be considered:

- experience and training of employees
- genetics
- noise reduction
- solid-sided equipment
- equipment adjustment and maintenance
- reduction in the use of electric prods
- eliminating distractions (light change, moving objects, people ahead of animals)
- properly designed and sized handling facility

Beef Quality Assurance

Consumers today are very concerned about the safety of the food they eat. Perception of safety and wholesomeness play a major role in buying decisions of an increasingly health concerned and diet-conscious consumer. American beef enjoys an excellent reputation and is consumed by millions of consumers throughout the world. However, most consumers lack the background or technical knowledge to understand scientific details of beef production. Surveys show consumers respond negatively when a food safety incident occurs and is widely reported by the media.

Cattlemen are highly regarded by the public and the beef they produce is generally regarded as safe and wholesome. With ever increasing competition for the consumer's protein dollar, it is imperative that producers maintain and improve that image. By assuring the consumer that beef is safe and wholesome, from the cow-calf producer to the dinner plate, and increasing the efficiency of production, the beef industry has an opportunity to become even more competitive in the worldwide market place.

In response to this opportunity, the Minnesota Beef Council, in cooperation with the University of Minnesota Extension Service, College of Veterinary Medicine, College of Agriculture, Food and Environmental Sciences, and the Minnesota State Cattlemen's Association, has developed the Beef Quality Assurance educational program to educate producers on how to raise quality cattle that produce the highest quality beef available in the marketplace.

Why is Quality Assurance Important?

Consumers demand that beef is easy to fix, tasty, tender, wholesome and affordable. Most consumers do not care who raised their food as long as the animals were healthy, well cared for and produced under environmentally-responsible practices. With increasing competition from the poultry and pork

industries, and consumer anxieties over the safety of beef, all beef producers, dairymen and veterinary practitioners must be concerned with issues that affect beef quality, consistency and safety.

Some producers and veterinarians may feel far removed from the consumer's eating experience. However, lesions caused by improper injection site placement affect beef tenderness. Abscesses from injection site lesions are not very appealing, and may contain pathogens or antibiotic residues. Harmful pathogens like E. coli 0157:H7 can often be traced to manure-ladened hides that contaminate the carcass during harvesting and processing. The National Non-Fed Beef Quality Audit (1994), demonstrated that quality defects cut deeply into producer profits, taking nearly $70 out of their pockets for every cull cow and bull marketed.

Quality issues affect the producer's economic bottom line. The price of beef may increase to compensate for reduced carcass yields resulting from bruised or abscessed carcasses that must be condemned. Also, plant shutdowns due to burst abscesses on the fabrication tables, or bacterial contamination from hides, lead to increased production costs that must be passed on to the consumer. Producers are affected directly by receiving less for the beef they sell due to condemned carcasses and quality defects.

Public perception becomes reality, regardless of the truth, when enough people perceive something to be true. Consumers are bombarded with incorrect information and half-truths about agriculture in general and animal production in particular. The beef industry has to manage issues ranging from concerns with animal care/welfare, bovine spongiform encepalopathy (BSE) in Europe, the perception of chemical, hormone and antibiotic residues, periodic outbreaks of foodborne illness from pathogen contamination, cholesterol and saturated fat content, and the impact of cattle production on water and soil pollution, water and grain use, grazing and deforestation, and global warming.

Minnesota Beef Quality Assurance

Minnesota's Beef Quality Assurance program focuses on improving management practices that will enhance beef quality and help manage issues that may affect consumer attitudes toward beef. The program emphasizes the following topics:

- Preventing injection-site lesions and abscesses
- Residue prevention
- Elimination of bruises
- Hide quality improvement
- Early culling of beef and dairy cows to prevent lameness and disabled cattle

From the pasture to the dinner plate, every person in the chain must take responsibility for safe and proper practices. Cow-calf producers, feeders, dairymen, livestock market operators, backgrounders, veterinarians and others, all have a role in high-quality beef production. Responsibility for quality beef production is shared with packers, processors, purveyors, restauranteurs and retailers who also have a huge stake in marketing beef to the consumer.

Ultimately, the consumer must be provided with proper cooking and handling information to assure food safety and eating quality. Beef demand will be improved by producing a safe, wholesome and consistently tender product that exceeds consumer expectations with every eating experience. By following the simple procedures outlined in this lesson, beef and dairy producers and veterinarians can ensure that the beef they are producing meets the highest standards of quality, consistency and safety that the American consumer demands.

For more information on this topic please review the Herd Health Home Study Course lesson 6 on Beef Quality Assurance. This can be downloaded at www.extension.umn.edu/county/pipestone. You can also contact the Minnesota Beef Council for more information (http://www.mnbeef.org).

Summary

Livestock production in a feedlot/stocker operation can be very complicated. With proper preparation and planning, many obstacles can be avoided so other management decisions become the focus. One tool to assist with this is a herd health protocol, developed with a local veterinarian, addressing all the items listed in this lesson. Cow-calf producers must determine if they are getting rewarded for vaccination efforts. Preparation for the unexpected is extremely important.

Additional References and Further Reading

- DiCostanzo, A. 1998. "Strategies for Profitable Breeding, Managing, and Marketing of Feeder Calves." 1999 Minnesota Cow/Calf Report. To obtain a copy contact Department of Animal Science, 205 Haecker Hall, 1364 Eckles Avenue, St. Paul, MN 55108-6118, Telephone: 612-624-4995, Fax: 612-625-1283, Email: bjrae@umn.edu

- Eustice, R., DiCostanzo, A. 1998. "Beef Quality Assurance Fundamentals." University of Minnesota Beef Herd Health Home Study Course lesson six. Down load a copy of this lesson at the following web site: http://www.extension.umn.edu/county/pipestone

- Richey, E., Gill, D., Armbruster, S., "Management of Newly Arrived Stocker Cattle," Oklahoma State University fact sheet - F9102. Publications can be ordered through University Mailing Services, Oklahoma State University, Stillwater, OK 74078; phone: 405-744-5385.

- Grandin, T., 1998. "Handling Methods and Facilities to Reduce Stress on Cattle." Veterinary Clinics of North American: Food Animal Practice, Vol. 14, No. 2. More information is available at www.grandin.com

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- Ames, T., 1997. "Tailoring Receiving Health Programs to Feeder Cattle Origin." 1997 Minnesota Cattle Feeders Report, B-446. Printed copy in Appendix A.

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- Cattle-Fax, 1995. NCA-IRM Calf Information Task Force Survey. *Cattle Marketing Information Service, Inc.* More information is available at www.cattle-fax.com.

- Hogan, T. and P. Gutierrez. 1997. "Pencil It Out: How big a discount can you stand before preconditioning pays for itself." *Beef*. Spring. More information is available at www.beef-mag.com

- King, M.E., T.E. Wittum, M.D. Salman, and K.G. Odde. 1996. "The effect of value added health programs on the price of beef calves sold through seven Superior Livestock video auctions in 1995." *Colorado State University Beef Prog. Rep.* pp. 167-173.

This lesson prepared by:

Troy Salzer
Extension Educator-Livestock Systems
University of Minnesota Extension Service
310 Chestnut Street, P.O. Box 307
Carlton, MN 55718-0307
(218) 384-3511 salze003@umn.edu

Kirby Hettver
Extension Educator-Livestock Systems
University of Minnesota Extension Service,
Colonial Square, 208 Atlantic Ave
Morris, MN 56267-1321
(320) 589-7423 hettv001@umn.edu

Alfredo DiCostanzo, PhD
Animal Scientist, University of Minnesota, 1364 Eckles Ave, 155A Haecker Hall
St. Paul, MN 55108-6118
(612) 624-1272 dicos001@umn.edu

Ron Eustice,
Minnesota Beef Council
2850 Metro Drive Suite 426
Minneapolis, MN 55425
(612) 854-6980 reustice@mnbeef.orbis.net

Notes

Lesson 1 Quiz Feeder Calf Management for Successful Marketing

1. Product quality is a combination of _____.
    a) genetics and feeding
    b) health and handling
    c) all of the above
    d) none of the above

2. What should be the two main objectives for a feedlot health program?
    - _____
    - _____

3. Name four goals that might be included in a feedlot program?
    - _____
    - _____
    - _____
    - _____

4. According to Table 1, a cow/calf producer should receive an additional $_____ for a 550 lb calf that has been both health processed and weaned for 21 days.
    a) 2.02
    b) 1.18
    c) 3.21
    d) none of the above

5. T or F. Cattle are usually at greater risk of illness after arrival to a new environment.

6. What are the three main items addressed in a health program protocol?
    - _____
    - _____
    - _____

7. Which practice is not recommended when handling animals?
    a) Reduction of noise
    b) Solid sided equipment
    c) Increased usage of electric prods
    d) Proper equipment adjustments

8. List 4 things that beef consumers demand.

   - _____
   - _____
   - _____
   - _____

9. According to the National Non-Fed Beef Quality Audit, _____ is taken out of producer profits for every cull cow and bull marketed.
   a) $5
   b) $70
   c) $35
   d) $60

10. What 5 topics are emphasized in Minnesota's Beef Quality Assurance Program?

    - _____
    - _____
    - _____
    - _____
    - _____

Please list any questions you may have that weren't answered in this lesson:

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Name _____Phone_____

Address_____

(Optional) Fax_____E-mail_____

APPENDIX A

1997 Minnesota Cattle Feeder Report B-446

TAILORING RECEIVING HEALTH PROGRAMS TO FEEDER CATTLE ORIGIN

Trevor R. Ames, DVM, MS
Diplomate ACVIM
Professor and Chair
Department of Clinical and Population Sciences
College of Veterinary Medicine
University of Minnesota, St. Paul

INTRODUCTION

The goal of feeding cattle is to make a profit while bringing a quality product to the market. In the feeder/stocker business, on average, profit is greatest when cattle gain weight efficiently and reach the desired slaughter weights in the shortest time possible. Factors such as feed costs, purchase price and sale price often have even greater impact on profit than feed efficiency and average daily gain but are to some extent difficult to control for the feedlot operator. To ensure that the cattle come on feed well and continue to stay on feed throughout the feeding period, both disease and stress must be minimized and, with this, the feedlot operator has some control.

Assessing Incoming Cattle

In an ideal world all incoming cattle would be immune to major pathogens, and know how to eat from a feed bunk and drink from a water trough. They would not need to be castrated or dehorned. The heifers would not be pregnant and the cattle would be free of parasites. The cattle would also arrive and start on feed without undergoing any stress that would diminish the immune response. In evaluating incoming cattle, the level of immunity, the exposure to pathogens during the marketing and transport process, the degree of stress during marketing and transport as well as the level of stress after arrival in the feedlot all need to be considered.

Calves under 600 pounds will have little acquired or naturally occurring immunity when compared to yearling cattle. This lack of acquired immunity can be overcome if the calves have been pre-immunized or pre-conditioned in advance of sale and transportation. In addition, calves will be more susceptible to stress especially if they are not weaned, castrated, or dehorned and spend too long in market channels and on transport trucks.

As a rule, cattle from a known source can usually be assumed to behave in a predictable manner but it is still important to evaluate the cattle on arrival and consider unusual stresses such as severe weather or prolonged transit. Incoming cattle should be evaluated on arrival for signs of disease such as temperature, nasal or ocular discharge or shrink (percent weight loss due to shipment). Cattle that have shrunk more than 7% can be assumed to be highly stressed and at high risk for health problems.

Incoming cattle can be categorized based on source, age, and processing history (Pollreisz, 1995). For example:

Category 1 (healthy)	Yearling cattle, minimal stress held 4 to 6 weeks prior to shipping
Category 2 (intermediates)	Yearling cattle stressed by shipping and/or previous management or preconditioned calves (< 600 lb) not stressed by transportation and marketing
Category 3 (high-risk)	Calves (< 600 lb) that have been purchased through sale barns which are not preconditioned
Category 4 (high-risk, naive)	Freshly weaned calves (<600 lb) coming directly from farm or ranch

These broad categories can be used to determine the appropriate receiving protocol for the incoming cattle.

Receiving Protocols (General)

General recommendations for handling incoming cattle can be made that would be appropriate for any category of animal. The 3 R's of a receiving program (i.e., rest, rehydration and rumen restoration) need to be addressed (Pollreisz, 1995). Cattle will be physically and psychologically stressed by the marketing and transportation processes. It is useful for these cattle to be rested for 12 to 24 hours prior to processing to allow the immune system to overcome the effects of stress. Prolonged holding prior to processing is associated with increased illness and holding times over 48 hours should be avoided. Holding pens should be clean and dry or have dry bedding (if pens are wet from excessive precipitation) as this will allow all cattle to lay down and rest. Shelter from wind, sun, rain and dust should also be present in the receiving pen.

Holding pens should have 150 to 200 ft^2 of pen space per animal and 12 to 16 in of bunk space per animal and be located close to the processing facility. Excess mixing of cattle in the receiving pens should also be avoided.

It is important that incoming cattle have access to clean fresh water. Raised spigots have been suggested as a way to teach incoming cattle to drink out of automatic watering devices as cattle will be attracted to the sound of splashing water. Incoming cattle should also be offered good quality long grass hay on arrival. This is the most similar to what cattle are used to on range. Hay is the best feedstuff for restoring or refilling the rumen. Hay can be put in the feed bunks as well as feeders in the pen as a way of teaching cattle to eat out of bunks. Hay feeders may also be put along the pen perimeter to decrease walking the fence line and encourage eating. The starter ration is an important source of energy and should be highly palatable. The proportion of the starter ration dry matter which is forage, is not usually less than 50% as this will prevent problems of acidosis. Starter rations often contain a coccidiostat as coccidiosis can occur in calves after commingling.

Receiving Protocols (Specific)

Processing protocols may be tailored depending on the category of the incoming cattle. Processing options include a number of pharmaceutical options. Vaccination (respiratory and non-respiratory) vitamin injections, implanting, deworming for internal parasites and acaricides for external parasites (may be same product for both), long acting antibiotic therapy, drugs for aborting pregnant heifers, and probiotic administration. Management procedures for processing would include ear tagging, branding, tail trimming, castration, tip dehorning, and temperature sorting. Some management procedures such as castration and dehorning could be left for a later time such as at reimplanting at 70 to 90 days on feed (if cattle are expected on feed for more than 150 days). "Temping" on arrival can be very useful as even cattle that look bright can have very high temperatures and thus, can be identified as "sick" by this procedure.

Although most of the pharmaceutical compounds suggested are accepted as standard procedure, some remain controversial. Injectable vitamins have not been documented to be of value and concerns over injection sites probably make their usage unnecessary. Similarly, oral probiotics (rumen starters) have little documented efficacy and the labor required for oral administration make these of questionable value. Injectable long acting antibiotics can also be used as part of processing incoming cattle. The tables below document the positive effects of two long acting antibiotics when used on arrival in feedlot cattle (Mork et al., 1993). The effects on health parameters is shown in Table 1. The effects on production parameters is shown in Table 2 (Mork et al., 1993).

All injectable compounds should be given in the neck for intramuscular or subcutaneous injections. Care must be taken in handling all live vaccines so that time, temperature, disinfectants, and sunlight do not inactivate these vaccines. In addition, it must be remembered that reduced doses or half doses of vaccines and dewormers do not save money as the cattle will not be properly immunized or fully dewormed.

Table 1. Examination of morbidity in feedlot calves (number of treated calves).

	Group		
	No antibiotic	Oxytetracycline	Tilmicosin
Morbidity			
Pneumonia			
No. of treatments*			
1	273[a] (45)†	189[b] (31)	137[c] (23)
2	115[a] (42)	66[ab] (34)	43[b] (31)
3	23[a] (20)	14[a] (21)	8[a] (19)
All causes			
No. of treatments*			
1	373[a] (62)	298[b] (49)	249[c] (41)
2	149[a] (40)	91[b] (30)	66[b] (27)
3	23[a] (15)	26[a] (29)	18[a] (27)
Initial pneumonia treatment			
Mean no. of days ‡	10.5[a]	12.9[b]	14.5[b]
Total§	254[a] (42)	157[b] (26)	117[c] (19)

* Refers to the number of treatment regiments received.

† Numbers in parentheses are percentages of possible cases.

‡ Numbers refer to mean days to initial treatment for bovine respiratory tract disease (BRD) (i.e., after prophylaxis).

§ Numbers refer to the total number of initial treatments for BRD within the first 30 days.

[a,b,c] Numbers within the same row without a common letter superscript are significantly different ($P<0.05$).

Table 2. Mean total weight gain (kg) of treated and untreated feedlot calves in the 3 experimental groups.

	Group			
No. of treatments	No antibiotic	Oxytetracycline	Tilmicosin	Means*
0	136 ± 2 (316)†	139 ± 2 (408)	143 ± 2 (455)	140 ± 1[a]
1	122 ± 3 (149)	123 ± 4 (115)	127 ± 4 (91)	124 ± 2[b]
≥2	113 ± 3 (108)	105 ± 4 (63)	114 ± 6 (43)	110 ± 3[c]
Mean	124 ± 2[de]	122 ± 2[d]	128 ± 2[e]	

* These values refer to least square means adjusted for the number of animals in each group and for the number of days on test.

† Numbers in parentheses refer to the number of animals in each group.

[a,b,c] Means without a common superscript in this column are significantly different ($P < .05$).

[d,e] Means without a common superscript in this row are significantly different ($P < .05$).

Processing Protocol for High Risk Calves (Category 3 & 4)

1. Modified live IBR, BVD, BRSV, and PI3 vaccine.
2. 8-way clostridial bacterin.
3. Ivomec/Dectomax type "pour-on".
4. Pasteurella and Haemophilus vaccine.
5. Implant.
6. Ear tag identification.
7. Bulls castrated with bander.
8. Tip dehorning.
9. "Temp" all incoming cattle and sort by temp (i.e., >105° F - treat with Micotil).
   - all others - long acting oxytetracycline.

Processing Protocol for Preconditioned Calves (Category 2)

1. Modified live IBR, BRSV, BVD, and PI3 vaccine.
2. Pasteurella and Haemophilus vaccine.
3. Ear tag identification.
4. Implant.
5. "Temp" all incoming cattle and sort by temp (i.e., >105° F - treat with Micotil).
   - all others - long acting oxytetracycline

Processing Protocol for Stressed Yearlings (Category 2)

1. Modified live IBR, BVD, BRSV, and PI3 vaccine.
2. 8-way clostridial bacterin.
3. Ear tag identification.
4. Implant.
5. Ivomec/Dectomax or Spotton "pour-ons" if days on feed will allow for withholding times needed.
6. "Temp" all incoming cattle and sort by temp - treat with Micotil or long acting oxytetracycline if temp >105° F.

Processing Protocol for Healthy Yearlings (Category 1)

1. Modified live IBR, BVD, BRSV, and PI3 vaccines.
2. 8-way clostridial vaccine.
3. Ear tag identification.
4. Implant.
5. Ivomec/Dectomax or Spotton "pour-ons" if days on feed will allow for withholding times needed.

Monitoring for Disease in Incoming Cattle

Receiving pens must be closely monitored by pen checkers to ensure sick cattle can be detected as early as possible. Pen checking twice a day is often recommended for cattle in the first few weeks after arrival to ensure that cattle will have early detection of disease and successful treatment outcomes.

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