



UNIVERSITY OF  
FLORIDA

EXTENSION

Institute of Food and Agricultural Sciences

VM106

## Shipping Healthy Calves<sup>1</sup>

E.J. Richey<sup>2</sup>

### Introduction

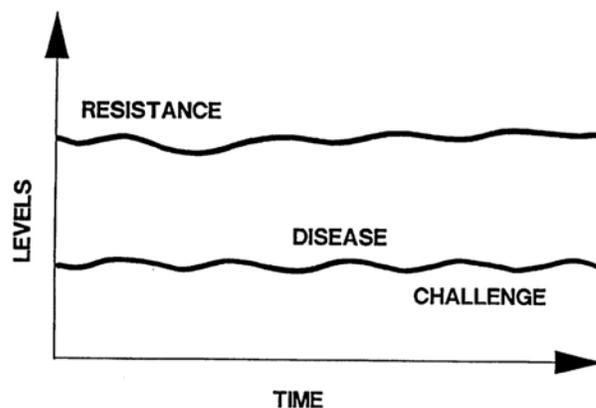
Feeder calf buyers prefer to purchase calves that will reach a desired weight and grade with some degree of predictability. This allows the calf buyers to make a confident prediction as to the cost of growing and finishing the calf; if they can not predict these costs, they must "discount" the price paid for a calf.

Calves that are sick on arrival or that will get sick at the feedyard cost money; not only in cost of medications to treat the sick animal, but in the production loss or "setback" that the sick calf will experience. A recent study in Texas has shown that a group of feeder cattle that got sick at the feedyard cost the owner \$91.23 in medication and production losses. In reality, the sick calves were worth \$.16 less per pound than calves that never required treatment ( $\$91.23 \div 579 \text{ lb. average purchase weight}$ ), and should have been legitimately discounted at purchase.

For cow/calf producers to obtain the highest possible price for their calves, they must produce calves that are healthy and will stay healthy.

### A Healthy Animal

To understand how to produce healthy calves that will remain healthy, we first must understand what a healthy animal is. A healthy animal or herd of animals exists when the resistance level of the animal(s) remains above the disease challenge level (Figure 1).



**Figure 1.** A calf's resistance level should remain above its disease challenge level.

### Disease

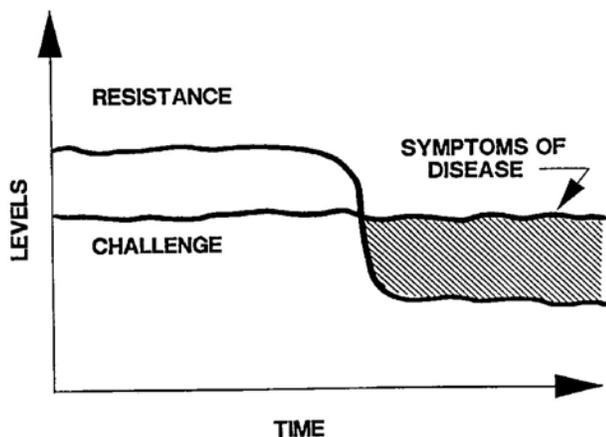
If the resistance level or the disease challenge level in a calf intercept for any reason, sickness occurs.

1. This document is VM106, one of a series of the Veterinary Medicine-Large Animal Clinical Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date March 28, 2000. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. E.J. Richey, Professor, Department of Large Animal Clinical Sciences, College of Veterinary Medicine, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

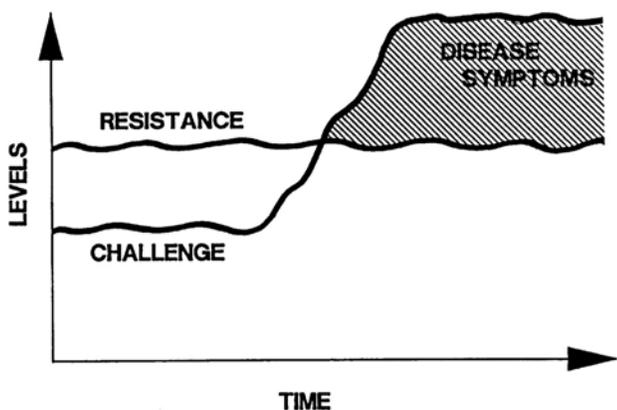
The Institute of Food and Agricultural Sciences is an equal opportunity/affirmative action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap, or national origin. For information on obtaining other extension publications, contact your county Cooperative Extension Service office. Florida Cooperative Extension Service/Institute of Food and Agricultural Sciences/University of Florida/Christine Taylor Waddill, Dean.

Disease symptoms occur in an animal when the animal's resistance level drops to below an existing disease challenge. A drop in resistance can be caused by weaning, shipping, castration, diet changes, coccidiosis, worms, and viral infections.



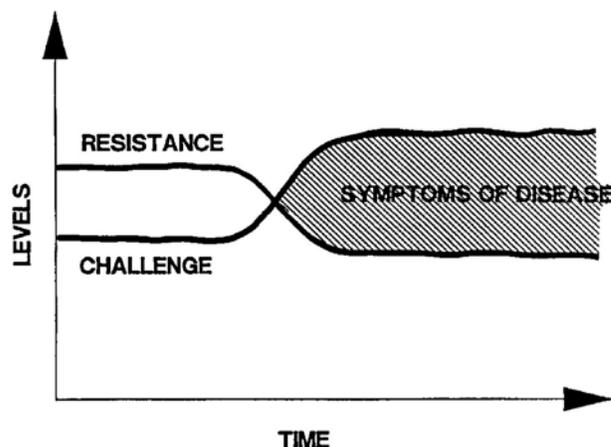
**Figure 2.** Calves will sicken if their resistance levels drop too far.

Symptoms of illness occur in an animal when a disease challenge rises to above the animal's resistance level to that particular disease. Disease challenges that substantially increase at the time of marketing include: IBR, PI3, BVD, BRSV, Pasteurella, *Haemophilus somnus*, and blackleg diseases.



**Figure 3.** Calves will sicken if their disease challenges rise too high.

The worst-case scenario occurs when the animal's resistance level is dropping and a disease challenge level is rising at the same time; calves get severely sick very fast (Figure 4).

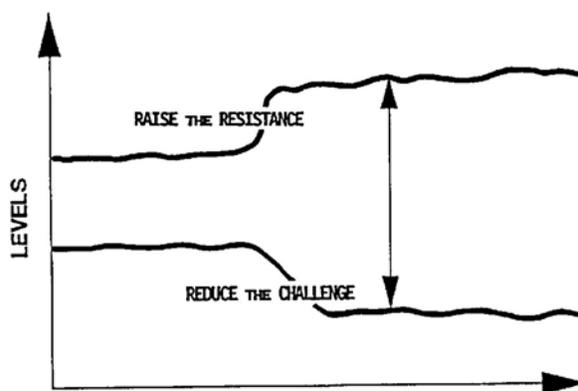


**Figure 4.** The worst-case scenario.

### Keeping Calves Healthy

To keep calves healthy, all we have to do is recognize the disease challenges that they will be exposed to, know when those challenges will occur, and then either raise the calf's resistance level by proper vaccination, reduce the disease challenges, or do both.

Vaccines will stimulate a rise in an animal's resistance to specific diseases. Antibiotics, the control of both internal and external parasites, and certain management changes will reduce the disease challenges (Figure 5).



**Figure 5.** Raising resistance and reducing challenge.

The disease challenges to which feeder calves are exposed have been recognized for many years. Basically they can be grouped into disease types as follows: respiratory diseases, gut diseases, muscle diseases, internal parasites, and external parasites. The problem is usually understanding when the disease challenges occur.

## Preparing Calves for Market

To insure that calves are healthy and will remain healthy, all calves must be properly prepared before marketing and shipment. Proper preparation prevents the resistance level from dropping drastically, raises the level of resistance against certain diseases, and reduces certain disease challenges. In essence, with proper preparation, we keep the resistance level and disease challenge levels from intersecting.

To adequately prepare calves before marketing we must use the "tools of the trade" available to us. To keep the calves' resistance from drastically dropping, calves should be dehorned, castrated, branded and exposed to commercial feeds *while they are nursing their mamas*. Calves can handle stresses much more easily if they are still with their mothers. We can reduce certain disease challenges by using certain products and management techniques. Worms can be removed by de-worming; grubs, lice and flies can be controlled by external parasite control agents; certain bacterial diseases can be controlled by use of antibiotics and/or sulfa drugs; and coccidiosis can be controlled by use of coccidiostats. We can raise the resistance to certain diseases by use of vaccines.

To prevent a "wreck," we must keep the animal's resistance well above the disease challenge level during marketing. (figure 6) To do this, we must keep the animal's resistance level from dropping, stimulate a rise in the animal's resistance with proper vaccination, and reduce the existing disease challenges; all must be done before marketing.

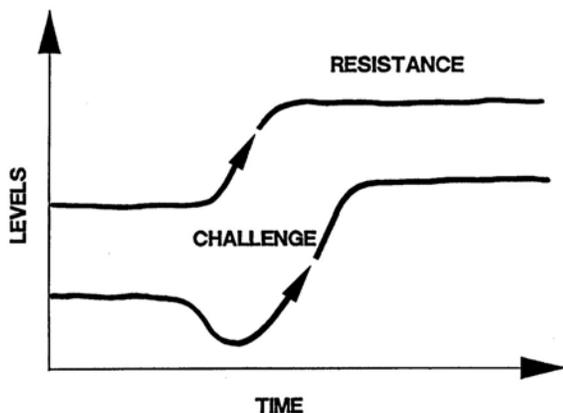


Figure 6. Maintaining resistance.

**Before leaving the farm or ranch of origin, all calves should be:**

- Dehorned and castrated (bulls)
- De-wormed, de-liced, de-grubbed
- Exposed to a commercial or milled feed
- Properly vaccinated against:

IBR (Infectious Bovine Rhinotracheitis), PI3 (Parainfluenza 3 virus), BVD (Bovine Virus Diarrhea), BRSV (Bovine Respiratory Syncytial Virus), *Pasteurella haemolytica*, 7-Way Clostridial (Blackleg diseases), *Haemophilus somnus*, 5-Way Lepto

The trick to successfully raising the resistance by use of vaccines is not only selecting the proper vaccine, but knowing how vaccines work and timing the vaccination so that the resistance level is raised before the disease challenge occurs. For example, let's assume that we will be using the non-replicating form of vaccines; these forms require two doses of vaccine administered at least 21-28 days apart with the first dose administered when the calf is four months of age or older.

The first dose just triggers the memory system in the animal; the second dose should stimulate a significant rise in resistance.

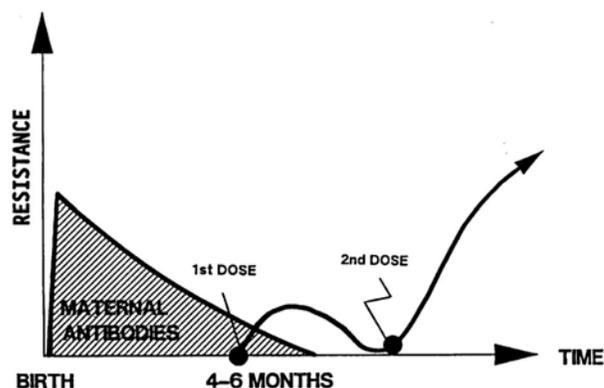
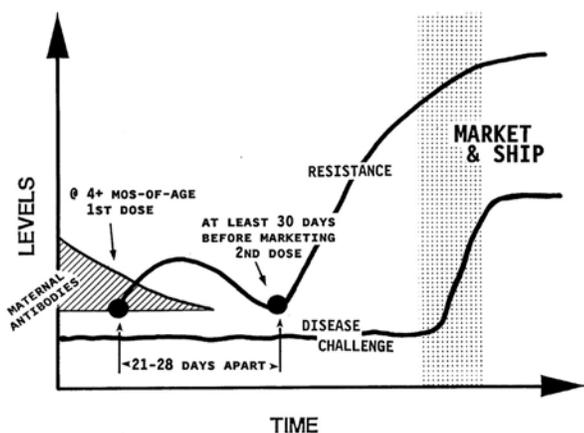


Figure 7. The two doses of vaccines should be given at least 21-28 days apart.

When sending calves through a commingling market, where the disease challenge level starts up rapidly on the day the calves leave the farm,

marketing should not occur until at least 30 days after the second doses of vaccines are administered.

Vaccination of calves will stimulate a rise in the resistance level in the calf if the vaccine is given at the appropriate time; ie, the first dose is administered when the calf is at least four months of age and the second dose is administered at least 21-28 days after the first dose and at least 30 days before marketing. (Figure 8)



**Figure 8.** Time vaccinations to stimulate rise in the resistance level.

It is unfortunate, but calves that are marketed through the livestock markets are thought of as "put-together" calves and are considered high risk calves primarily due to the commingling and to a lack of information about previous health processing.

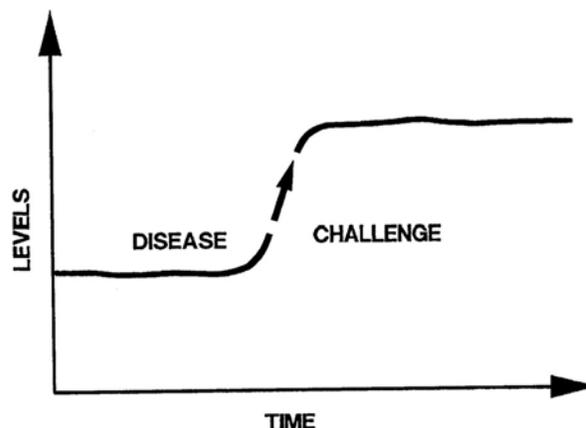
Regardless of the vaccination history of the calves, the feedyards receiving these calves will re-vaccinate on arrival, as well as de-worm and de-grub. They hope they are boosting the vaccinations rather than just starting a vaccination program in a load of inadequately prepared calves.

### Commingled Calves

Livestock markets and order buyer's facilities are commingled calf markets; calves are commingled from many different farms or ranches during and after marketing. In commingled calves, the disease challenge goes up rapidly, beginning on the day they leave the farm and go to market.

The rapid rise in disease challenges occurs because of the commingling of calves from many

different sources. (figure 10) Disease-susceptible calves, neither vaccinated against or exposed to certain diseases, are mixed with healthy calves that are carriers of diseases. Needless to say, the disease agents are transmitted to the susceptible calves at the commingle markets; hence, the disease challenge is on the rise.



**Figure 10.** Commingling increases disease challenge.

These calves are usually delivered to the local livestock auction, tagged, sold to order buyers, and shipped to the order buyer's assembly and distribution center. At the order buyer's center, the calves are commingled with calves purchased from many different livestock auctions, sorted into loads of uniform calves, and shipped to the feeder or stocker operations. (figure 11) This process of selling, buying, sorting, and shipping could take 3-7 days to complete. Theoretically, a load of 100 animals could be composed of calves from 100 different farms. The disease exposure, the presence of resistant disease strains, the increased stresses, and the diet restrictions applied to the calves begin immediately after they leave their farm of origin.

If not properly prepared before marketing, these commingled calves have the potential to "wreck out" on arrival.

A "wreck" can easily occur in improperly prepared calves due to a simultaneous fall in resistance and rise in disease challenges. The fall in the resistance level is primarily due to weaning, shipping, diet change and other stresses. The rapid rise in disease challenges is predominately due to the

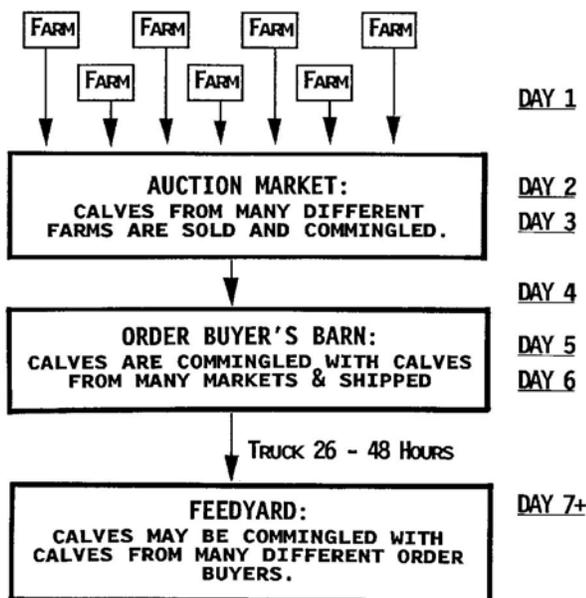


Figure 11. The mixing process of commingled calves after leaving the farm.

commingling effect on calves from many different farms.

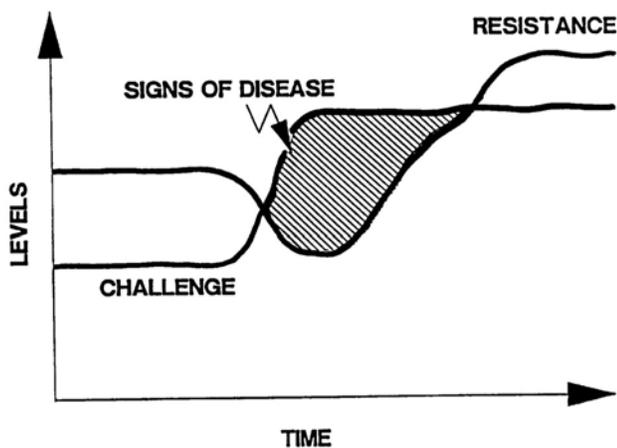


Figure 12. "Wrecking out"

### Direct Sale Calves

In contrast to commingled calves, a load of direct sale calves usually originates from one ranch. They are from beef operations of sufficient size to raise and sort loads of uniform calves that are shipped directly to the feeder or stocker operations without commingling.

The shipping time is considerably less. Usually only 24-72 hours lapse between the time the calves are removed from their mothers and their arrival at

the feedyard or stocker operation. In a lot of cases, these calves will remain together as a closed group until they are slaughtered; they are never commingled with calves from different sources.

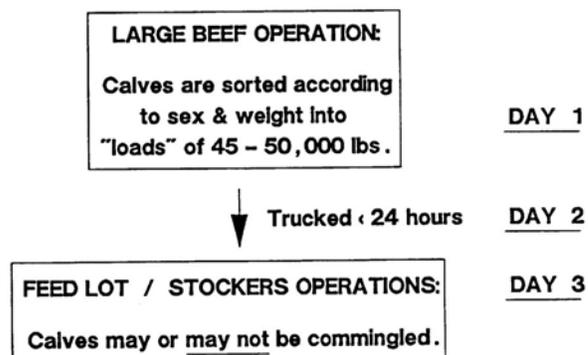


Figure 13. Direct sale calves are shipped without commingling of calves from other sources.

Direct sale calves will be exposed to the same diseases challenge levels as commingled calves; however, the rate of application is much less. For direct sale calves, the disease challenges start later and increase much more slowly. (figure 14)

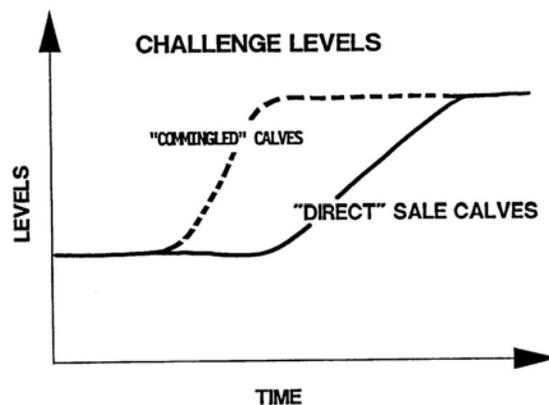
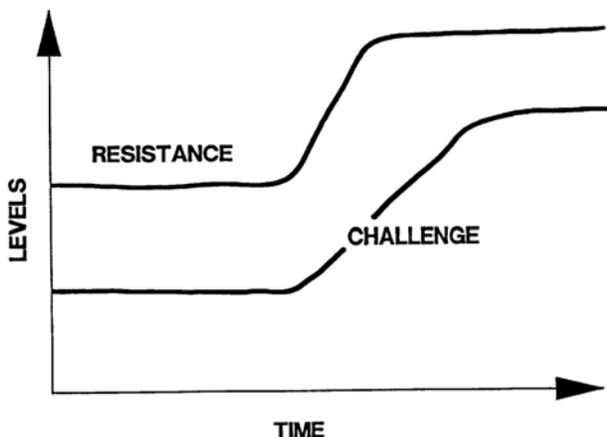


Figure 14. The disease challenges for "direct" sale calves are applied at a much slower rate.

This slower rate of disease challenge usually allows the direct sale calves adequate time to respond to the on-arrival processing. As long as the rate in the rise of the disease challenge remains slow, the resistance level of the calves stays above the disease challenge level and the calves remain healthy. In some cases, even *inadequately* prepared direct sale calves will still have sufficient time to respond to the on-arrival processing and vaccination programs before the disease challenges reach a significant level. Inadequately prepared direct sale calves could easily

wreck out if the disease challenges were to increase suddenly rather than rise slowly. The same thing could happen if calves destined for direct sale were diverted to a commingled calf marketing system.

If direct sale calves are properly prepared before shipment, they will respond rapidly to the on-arrival processing at the feedyard or stocker operation; the spread between the resistance and disease challenge levels becomes very comfortable. (figure 15)

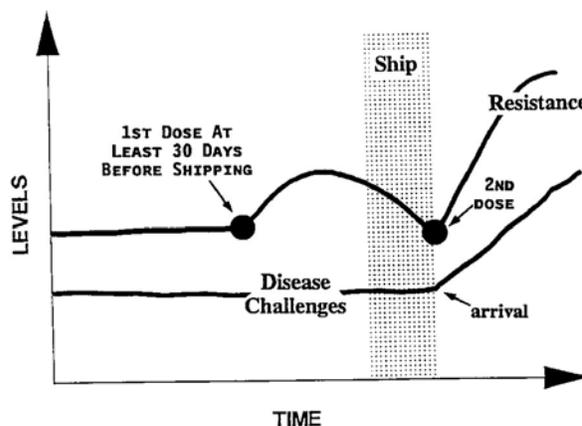


**Figure 15.** Comfortable spread between resistance and disease challenge levels in properly prepared direct sale calves.

In the case of direct sale calves, where the disease challenge starts on arrival at the feedyard or stocker operation and goes up at a much slower rate, calves may be shipped at 30 days following the first doses of vaccine provided the direct sale calves receive the second doses going on or coming off the truck. The resistance level will have adequate time to rise, following arrival, and “outrun” the increasing disease challenges.(figure 16)

### A Program for Rating Calves

*The industry needs to adopt a program that will identify prewean-processed calves as they are sold and/or purchased.* In such a program, buyers would have a better idea as to the risk they are taking on the future health of the calf before they buy. Is the calf partially vaccinated (*1X calf*), fully vaccinated (*2X calf*), or has the calf been fully vaccinated and been weaned for at least 30 days (*2X+calf*)? When calves are healthy and remain healthy, they will perform. Healthy calves develop a good reputation and this sets the ground work for repeat buyers.



**Figure 16.** Shipping time for direct sale calves in relation to vaccination and disease challenge.

The following is a suggested calf rating that could be used by the beef industry to rank calves that have received varying degrees of prewean processing (1X, 2X or 2X+ calves). I think the ranking is simple and provides only three options so as not to confuse the buyers or sellers.

### 1X Calves

The 1X calf program requires a one time vaccination against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnus*. The vaccines must be given after the calf is four months old and at least 28 - 30 days before the calf is sent to market. This one-time vaccination will “prime” the animal’s immune system. This priming effect does not stimulate a high level of resistance in the animal; however, the animal will be primed to adequately respond when the second doses of vaccinations are administered by the purchaser. Because of the lack of ample resistance, you must be aware of the possible problems when the 1X calves are challenged going to the different type markets (commingled vs direct). In addition, all calves must be dewormed and de-grubbed, bull calves must be neutered, and all horned calves must be dehorned. All surgical (neutering and dehorning) sites must be healed before the calf is sent to market.

### 1X Calf Requirements

- Male calves are steers (and healed).
- All calves are polled or dehorned and healed.

- All calves will be dewormed and degrubbed.
- All calves have been vaccinated once against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnus*. The vaccines must be administered when the calves are four months old or older and at least 30 days before marketing.
- Calves must be re-vaccinated on arrival to stimulate the needed rise in resistance. (Figure 16)

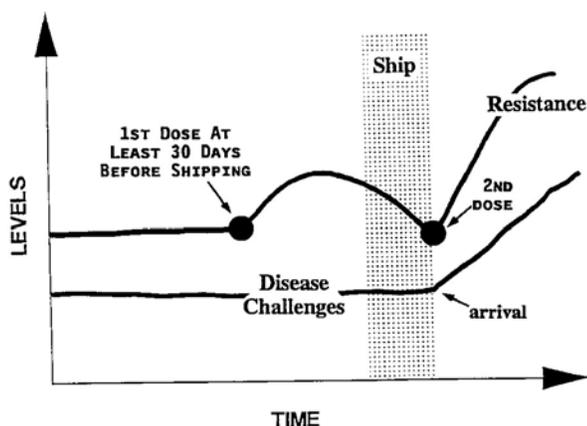


Figure 17. 1X calves in a direct market

If 1X calves are subjected to a rapid rise in a disease challenge (such as seen in "commingled" markets) before re-vaccination (second dose) they will most likely become sick with a bovine respiratory disease.

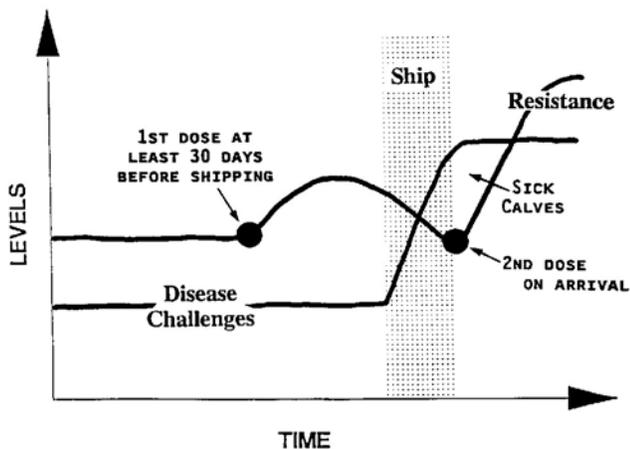


Figure 18. 1X calves in a commingled market.

## 2X Calves

The 2X calf program requires that the calf be vaccinated twice against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnus*. The first doses of these vaccines must be administered after the calf is four months old. The second doses must be administered at least 21-28 days after the first doses are administered and at least 30 days before the calf is sent to market. (Figure 19) The first vaccinations will prime the calf's immune system and the second doses of vaccines will stimulate a rise in the calf's resistance to the diseases if administered at the proper times. Administering the second doses of vaccines sooner than 21-28 days following the first doses will not allow time for the calf to adequately process the first doses and the second doses will not be able to stimulate a rise in the calf's resistance level. Marketing the calf too soon after administering the second doses of vaccine will not allow sufficient time for the calf's resistance level to rise; 30 days are required for the calf to reach the desired resistance level. In addition, all calves must be dewormed and degrubbed, bull calves must be neutered, and all horned calves must be dehorned. All surgical (neutering and dehorning) sites must be healed before the calf is sent to market.

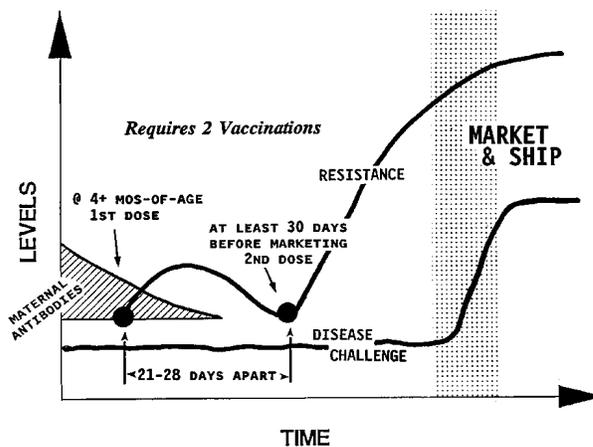


Figure 19. Allow calves to adequately respond to their second doses of vaccine.

## 2X Calf Requirements:

- Male calves are steers (and healed)

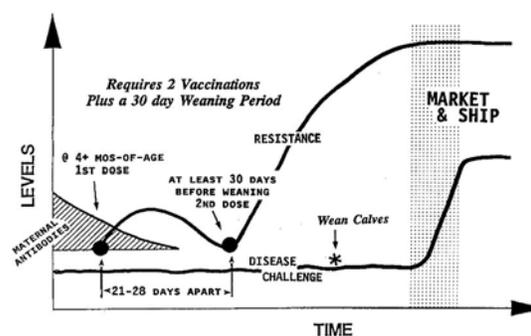
- All calves are polled or dehorned
- All calves will be dewormed and degrubbed.
- All calves have been vaccinated twice against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnus*. The first doses of vaccines must be administered when the calves are four months old or older and the second doses must be administered at least 21-28 days after the first doses and at least 30 days before marketing.

*Note:* If the first dose of 7-Way Blackleg vaccine is of the formulation which only requires one dose to stimulate resistance, a second dose may not be required. *Read the label!*

## 2X+ Calves

The 2X+ calf program requires that the calf be vaccinated twice and weaned for at least 30 days before marketing. The calf must be vaccinated against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnu*. The first doses of these vaccines must be administered after the calf is four months of age. If the first dose of 7-Way Blackleg vaccine is of the formulation which only requires one dose to stimulate resistance, a second dose may not be required. *Read the Label!* When second doses of vaccine are required, they must be administered at least 21-28 days after the first doses are administered and at least 30 days before the calf is sent to market. The first vaccinations will prime the calf's immune system and the second doses of vaccines will stimulate a rise in the calf's resistance to the diseases if administered at the proper times. Administering the second doses of vaccines sooner than 21-28 days following the first doses will not allow sufficient time for the calf to adequately process the first doses, and the second doses will not be able to stimulate a rise in the calf's resistance level. Marketing the calf too soon after administering the second doses of vaccine will not allow sufficient time for the calf's resistance level to rise; at least 30 days are required for the calf to reach the desired resistance level. Alternatively, since the 2x+ calf must be weaned at least 30 days before it can be marketed, the second doses of

vaccine could be administered at the time of weaning. The 30+ day waiting period before the calf could be sent to market would then allow the animal to adequately respond to the second doses of vaccines. (Figure 20) In addition, all calves must be dewormed and degrubbed, bull calves must be neutered, and all horned calves must be dehorned. All surgical (neutering and dehorning) sites must be healed before the calf is sent to market.



**Figure 20.** Administer the second doses 21-28 days after the first and at least 30 days before the calf is sent to market.

## 2X+ Calf Requirements:

- Male calves are steers (and healed)
- All calves are polled or dehorned
- All calves will be dewormed and degrubbed.
- All calves have been vaccinated twice against IBR, PI3, BVD, BRSV, 5-Way Lepto, *Pasteurella haemolytica*, 7-Way Blackleg and *Haemophilus somnus*. The first doses of vaccines must be administered when the calves are four months old or older and the second doses must be administered at least 21-28 days after the first doses and at least 30 days before marketing.
- Calves must be weaned for at least 30 days.

Again, regardless of the vaccination history of the calves, the feeding and stocker operations will re-vaccinate, as well as de-worm and de-grub the calves when they arrive. Their intent is to booster the vaccinations, not to begin a vaccination program in a load of inadequately prepared calves.

When calves are uniform, healthy, and remain healthy, they exhibit predictable performance. Since the calves have developed a reputation, a *good reputation*, the feeder and stocker operations will usually ask two questions:

- Where did those calves come from ?
- Who raised them ?

Predictable performing cattle are in demand!  
This is what the feeder and stocker operators are looking for in calves.