THE UNIVERSITY OF CALIFORNIA SIERRA FOOTHILL RANGE FIELD STATION BEEF & RANGE FIELD DAY

April 15, 1992
Browns Valley, California

THE UNIVERSITY OF CALIFORNIA SIERRA FOOTHILL RANGE FIELD STATION BEEF & RANGE FIELD DAY

COSPONSORED BY
SIERRA FOOTHILL RANGE FIELD STATION
UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION
DEPARTMENT OF ANIMAL SCIENCE
DEPARTMENT OF AGRONOMY &
RANGE SCIENCE

Wheelchair Accessible

SIERRA FOOTHILL RANGE FIELD STATION
BEEF AND RANGE FIELD DAY
APRIL 15, 1992

Theme: Raising a Live Calf Every Year

9:00 Registration - $8.00 (Proceedings, coffee, donut, lunch)

Posters

Posters representing several research and education activities may be viewed during the day in the meeting room

Morning Master of Ceremonies: Eric Bradford, Chair, Department of Animal Science, UC Davis

9:30 Welcome - Myron Oppenshaw, Rancher, Oroville, CA

9:45 Introductions - Mike Connor

10:00 Beef Cow Nutrition: Requirements for High Conception Rates - Bob Willoughby and Chuck Wilson.

10:30 Heat Synchronization Techniques - Cindy Daley

11:00 Sire Breeds for First Calf Heifers: Effects on Calving Difficulty and Calf Performance - Mike Connor

11:30 Diseases Affecting Reproduction in Beef Cows - Ben Norman

Noon: Lunch Served by YUBA-SUTTER COWBELLES

Afternoon Master of Ceremonies: Jim Oltjen, Animal Systems Specialist, Department of Animal Science, UC Davis

1:15 Gather and move to demonstration area at cow barn

1:30 Calving Assistance - Gerry Koenig

2:00 Immunologic Castration - Tom Adams

2:30 Animal Production Techniques:
- Guidelines for Responsible Animal Handling - Wayne Jensen
- Vaccination Techniques for Healthy Animals and a Wholesome Product - Ben Norman

3:30 Adjourn

PARTICIPATING SPEAKERS

Thomas E. (Tom) Adams, Associate Professor, Department of Animal Science, University of California, Davis

John M. (Mike) Connor, Superintendent, University of California Sierra Foothill Range Field Station, Browns Valley

Cynthia A. (Cindy) Daley, Graduate Student, Department of Animal Science, University of California, Davis

Wayne A. Jensen, Livestock Farm Advisor, University of California Cooperative Extension, Santa Barbara County, Santa Maria

Gerry Koenig, Internal Medicine Clinician/Beef Animal Production, Veterinary Medicine Teaching and Research Center, Tulare

Ben B. Norman, Extension Veterinarian, Veterinary Medicine, University of California, Davis

Bob L. Willoughby, Livestock Farm Advisor, University of California Cooperative Extension, Butte County, Oroville

Charles B. (Chuck) Wilson, County Director and Livestock Farm Advisor, University of California Cooperative Extension, Yuba-Sutter Counties, Yuba City

TABLE OF CONTENTS

	Page
Beef Cow Nutrition: Requirements for High Conception Rates - Bob Willoughby and Chuck Wilson	1
Beef Cow Nutrition: Requirements for High Conception Rates: Minerals - Chuck Wilson and Bob Willoughby	3
Synchronization of Estrus with MGA (Melengestrol Acetate) and Lutalyse in Yearling Heifers - Cindy Daley	5
First Calf Heifers Management - Mike Connor	11
Calving Assistance - Gerry Koenig	17
Pelvimetry - Gerry Koenig	21
Reproductive Function and Feedlot Performance of Beef Bulls, Steers or Bulls Actively Immunized Against GnRH: Effects of Synovex S - Tom Adams	23
Responsible Animal Care Practices? - Wayne Jensen	31

BEEF COW NUTRITION: REQUIREMENTS FOR HIGH CONCEPTION RATES

Bob Willoughby and Chuck Wilson

The goal of every beef cow operator is to produce a calf every year from every cow in the herd, or maybe it's to market a calf from 90% of the cows exposed to a bull during the breeding season. One of the most important elements in beef production is nutrition.

Factors to Consider in a Cow Nutrition Program

1. Stage of production (pregnant-lactating-open)
2. Age of females
3. Body condition
4. Weight of females
5. Specific area nutrient deficiency
6. Weather

Stage of production & nutrient deficiency will be the main emphasis of this program.

365-Day Beef Cow Year by Periods

Period 1	Period 2	Period 3	Period 4
90 days post calving	90 days pregnant & lactating	140 days mid gestation	45 days pre calving

Period 1. Period 1 is the 90-day period after calving when the cow is lactating at her highest level and calf growth is determined by the dams milking ability. The cow is also undergoing uterine involution, starting to recycle and must rebreed during this period. That is why it is the most nutritionally important period in the cow's production year.

Nutritional requirement for a 1,000 lb. cow is:

TDN = 12-14 lbs/day)
Protein = 2 - 2.5 lbs./day) 20-25 lbs. alfalfa hay

First calf heifers and larger cows (1200 lbs.), or cows in poor condition, should receive the higher levels.

Period 2. This period is when the cow should be in the early part of pregnancy while still milking and maintaining a calf. A low plan of nutrition during this period will effect the calf's growth rate. By the end of this period, the cow should be gaining weight.

The nutritional needs for this period are:

TDN = 10-12 lbs./day
Protein = 1.5-2 lbs./day

Period 3. This period has the lowest nutritional requirement for the beef cow. Cows can be placed on the poor quality feed without affecting her production and could lose 10% of her body weight with little or no consequences.

TDN = 7-8 lbs/day)
Protein + .8 lbs./day) Poor quality pasture or stubble

Period 4. This is the second most important period and is when many of the producers fail to feed the cows as well as they should.

The cow's needs during this period are:

TDN = 10-12 lbs./day
Protein = 1.5-2 lbs./day

The nutrition level at this time can influence birth weight of the calf and may lower weaning weight, as well as its liveability and general vigor. It will also lower milk production and lengthen the time it takes for the cow to start cycling again.

First-calf heifers have special needs and should be kept separate from the cow herd and fed to gain at least one pound per day. They continue to need special care through their second calving in order to maintain their early calving status in the cow herd.

The main cow herd should be condition-scored, and the bottom 1/3 should have extra feed in order to produce at an acceptable level.

Remember that forage quality will not only influence how many nutrients a cow will receive, but it influences the quantity of feed she will consume. A typical 1,000 lb. cow will consume 25-28 lbs. of good alfalfa hay but only about 15 lbs. of poor quality weather native grass.

The weather native grasses can only provide about 1/2 the nutritional requirements from November through January in most years.

Remember you must **FEED 'EM TO BREED 'EM.**

BEEF COW NUTRITION REQUIREMENTS FOR HIGH CONCEPTION RATES: MINERALS

Chuck Wilson and Bob Willoughby

Proper mineral supplementation is very important in the basic cow diet so they will conceive regularly and raise a healthy calf. Quite often, a mineral deficiency is masked by some other deficiency in protein, energy, disease, or another mineral. A high percent of the minerals needed in a diet is supplied by the forages.

There are several mineral elements that are necessary in this area. They are SELENIUM, PHOSPHORUS and MAGNESIUM. Calcium may also be limiting at times.

Work done by Dr. Morris at the field station indicated there is not a need for supplementation of salt, *(Morris, Delmas, and Hull, 1980)*. Generally speaking, salt is used as a medium to carry other minerals. It is also used to control grazing of cattle.

Phosphorus levels in forage at the field station during the summer and fall is less than 0.1% DM, *(Morris, 1983)*. The National Research Council suggests a minimum concentration of 0.18% during pregnancy. During the first three to four months of lactation, 0.28% is needed. Our forages have about 0.23% during this time frame. These slight deficiencies may be corrected with phosphorus supplements in blocks or liquid supplements.

Grass Tetany can be a problem in certain years. Typical problem years are when we have long periods of cold, foggy days or cloudy, rainy days. During these times, protein and potassium are high in the forages and low in magnesium and calcium.

Heavy milking cows are more prone to these nutritional problem as they are draining their reserves of magnesium and calcium. Cows should be started on their supplementation program at least 90 days prior to the critical time. I would begin in October using "**mag**" blocks or a liquid supplement containing sufficient levels of magnesium. Salt mixes with magnesium have not proven successful in most cases because of inadequate intake by the cattle.

Selenium is by far our greatest problem in mineral deficiencies. Most of the Sacramento Valley and the Sierra Nevada foothills are selenium deficient. Cattle, as well as other livestock, have been diagnosed with having White Muscle Disease. Other problems relating to this deficiency are weak calf syndrome, poor doers and retained placentas. In several instances, local trials have shown an increase in average daily gain with heifers treated with selenium.

To correct the problem, several methods are available: 1) rumen selenium pellets; 2) injectible selenium, and 3) veterinary prescribed salt mixes. Over-the-counter salt mixes have not increased the blood selenium to sufficient levels when used in a very deficient area. Prescription salt mixes of 100-200 ppm have corrected the selenium deficiency.

Injectable selenium has been effective in correcting the problem. This is short-term as the corrected blood levels last only about 90 days, thus necessitating the reinjection and rehandling of the cattle.

The most effective treatment for selenium deficiency is the use of the rumen selenium pellets. Two pellets are placed in the rumen via a balling gun. These pellets are known to last up to 24 months.

There are rumors that the FDA may reduce the amounts allowable in the feed supplements. This is due to pressure from the US and California fish and wildlife agencies. A decision should be forthcoming soon. This may mean we'll have to attack the problem differently.

In some areas of the state, there are other mineral deficiencies and toxicities, such as copper, molybdenum, etc., but they are not a major concern here.

SYNCHRONIZATION OF ESTRUS WITH MGA (Melengestrol Acetate) AND LUTALYSE IN YEARLING HEIFERS

Cynthia A. Daley

The recent emphasis on value-based marketing and predictability has caused many cow-calf producers to take a second look at estrus (heat) synchronization and artificial insemination (AI) programs. The improved selection technology now available with EPD's (expected progeny difference) allows producers the opportunity to maximize uniformity and predictability by utilization of proven AI sires.

In most cow-calf operations, the group of females that a synchronization/AI program is most useful for is yearling heifers. Since we have most of our calving difficulty in first-calf heifers, getting them bred to a calving-ease bull that will still provide moderate growth in calves is important. Birth weight is the most important factor in calving difficulty. Semen from low birth weight EPD bulls with high accuracy is available from several sources at a reasonable cost.

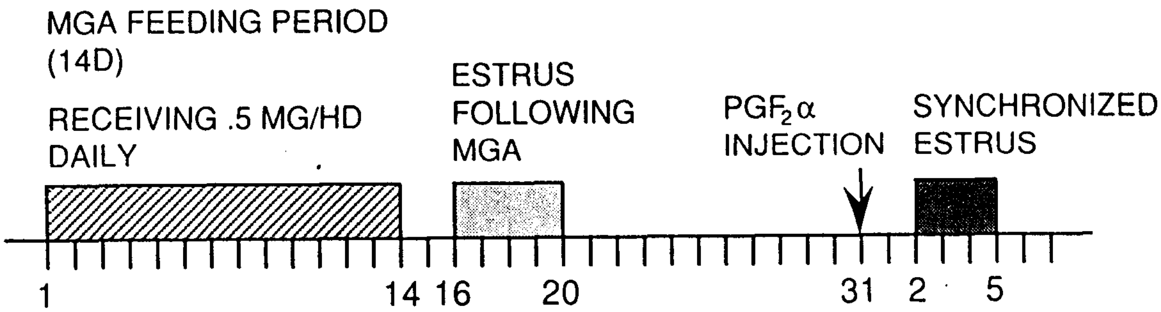
Synchronization of estrus and AI go hand-in-hand. By concentrating the largest percent of heat cycles to a short period of time, a producer is able to save time in heat detection, breeding and in the subsequent calving season. Heat synchronization also has advantages for natural sire matings, provided enough bulls are present at the peak of the synchronization period. Additionally, synchronization advances estrous cycles so all cycling females come into heat at the beginning of the breeding season, therefore calving earlier which produces heavier calves at weaning and allows for a longer postpartum interval with which to rebreed.

Programs established in the past have shown variable results. Three types of prostaglandins are now available for synchronization: Lutalyse (Upjohn), Estrumate(Mobay), and Bovilene(Syntex). Prostaglandins have the ability to short cycle heifers if they happen to be on days 5 thru 17 of their 21-day heat cycle (the period of an active corpus luteum on the ovary). On a large scale, the number of heifers actually showing signs of heat (riding, chin resting, pacing, vaginal mucus) has been variable. However, heifers successfully detected in heat and bred AI have a high rate of conception (heats are fertile).

Another synchronization program utilizes a norgestomet implant (progesterone) and an injection of estradiol/norgestomet. These compounds are similar to the hormones involved in a normal estrous cycle. The advantage is that a large percent will show heat, however, subsequent fertility has given variable results *(Spitzer, 1978)*. It has been suggested that this hormone combination is adequate to stimulate behavioral estrus but may not always be adequate to stimulate ovulation.

In 1984, researchers in the Department of Animal Sciences at Colorado State University, led by Dr. Ken Odde, set a goal of developing an estrus synchronization program that was **low cost, easily applied and would bring a high percentage of heifers into a fertile heat over a short period of time.** They chose to use Melengestrol Acetate (MGA), an oral progesterone widely used to suppress estrus in feedlot heifers, and Lutalyse, a prostaglandin, in combination.

Figure 1. The MGA-PGF2 system for synchronizing estrus.



The program involves feeding MGA at .5mg/hd/day for 14 days and an injection of prostaglandin 17 days after the last day of MGA feeding (Figure 1). Most heifers show heat 48-72 hours after the injection of prostaglandin. The MGA is incorporated into a pellet or some type of feed additive and can be purchased through a feed mill that handles this product.

The heifers will show heat over a 5 to 7 day period after withdrawal of the MGA, but this is a subfertile heat (poor conception rate) and heifers should not be bred at this time. Seventeen days later, however, the corpus luteum on the ovary is at the perfect stage for regression with the prostaglandin. This resulting heat is of above average fertility (high conception rate).

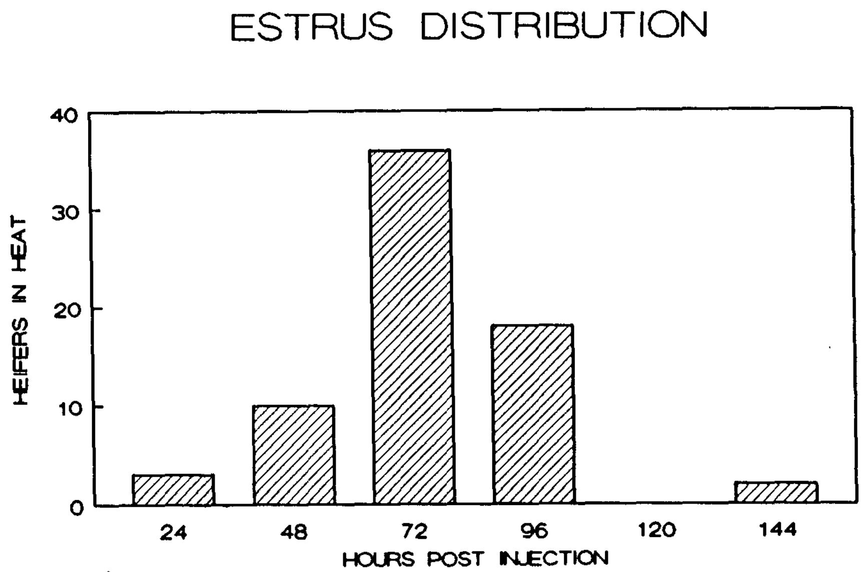
A 1989 study in Colorado used 360 heifers to compare MGA/PGF2 combination to untreated controls that were artificially inseminated on natural heats. They found that the synchronized heifers had a 7% higher first service conception rate compared to control heifers. The resulting estrus was tightly grouped - 77% of the synchronized heifers were AI'd in four days versus 70% of the control heifers in a 21-day period. **Additionally, this program will induce some of the noncycling heifers to cycle** (Brown, 1988).

During the fall of 1990, eighty-six crossbred yearling heifers (avg wt = 696 lbs) were placed on this MGA/PGF2 synchronization program at the Sierra Foothill Experimental Station. MGA was purchased through Kern Livestock Supplement Co., INC. in Bakersfield, California, in the form of a protein supplement with 1 milligram of MGA per pound of supplement (Stockade Feedlot Heifer Supplement). Thirty days prior to the normal breeding season, heifers were supplemented with 2.5 pounds of concentrate (corn/wheat) on a per head basis. The MGA was **thoroughly** mixed with this concentrate at the recommended level of .5 mg/head/day and fed for a fourteen-day period.

Seventeen days later (November 30, 1990), all heifers received a five milliliter dose of lutalyse.

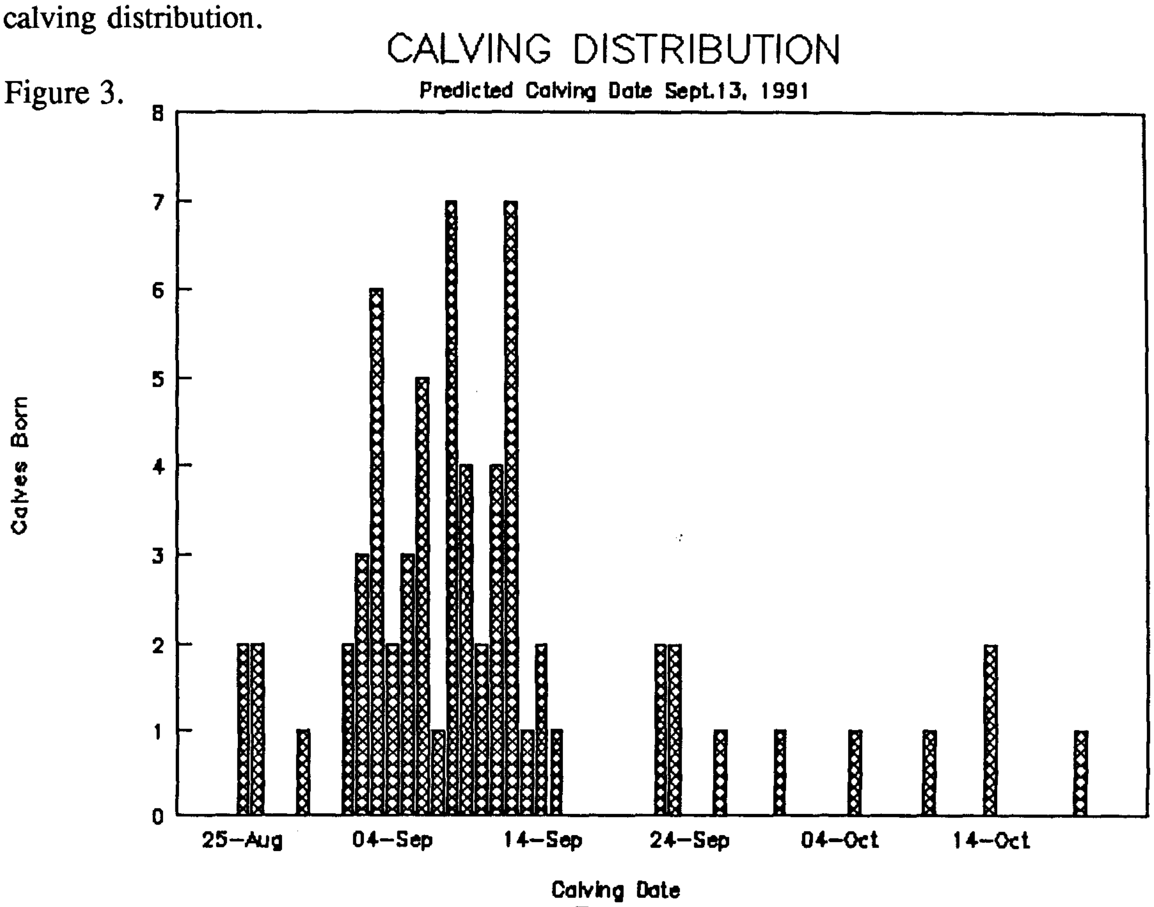
Sixty-nine of the eighty-six (80 percent) yearling heifers responded with visible signs of estrus and were inseminated with a single dose of semen. Figure 2 shows the distribution of estrus with peak heat activity occurring 72 hours post injection. Ninty- seven percent of the heifers that responded to the synchronization did so within four days of the lutalyse injection.

Figure 2.



Calving data revealed an eighty-three percent conception rate to first service on those heifers that responded to the synchronization technique. Figure 3 shows the actual calving distribution.

Figure 3.



Chenault, J.R., J.F. McAllister and C.W. Kasson. Synchronization of Estrus with Melengestrol Acetate and Prostaglandin F2 alpha in Beef and Dairy Heifers. J. Anim. Sci. 1990. 68:296-303.

Spitzer, J.C., Jones, D.L., Miksch, E.D. and Wiltbank, J.N. Synchronization of estrus in beef cattle III. Field trials in heifers using a norgestomet implant and injections of norgestomet and estradiol valerate. Theriogenology 1978, Vol 10, Pages 201-221.

FIRST CALF HEIFER MANAGEMENT

Mike Connor

Introduction

This presentation discusses several management methods for first-calf heifers which were evaluated at the Sierra Field Station over several years.

Methods

Yearling Polled Hereford heifers were bred to calve at 22 to 24 months of age in the fall of 1986, 1987, 1988 or 1989. Heifers were exposed to single sires; bulls were rotated at 21-day intervals. Parentage was determined by the coloring of the calf, by marks made by bulls wearing marking harnesses at breeding time, and, if necessary, by blood typing. Except during the 60-day breeding period, the heifers were run together on native range or irrigated pasture with supplemental feeding as necessary.

Sire breeds were Angus, representing a medium frame breed, Gelbvieh, representing a large frame type, and Texas Longhorn, representing a small frame type. All bulls used were purebred and were registered in their respective breeds. Angus and Gelbvieh bulls were selected to be representative of their breed with reasonably good body conformation, a growth rate somewhat better than the average of their herdmates, and birth weight average or slightly below average of their herdmates. Longhorn bulls were selected for reasonably good conformation for the breed. An attempt was made not to select "modern" body types which may have moved away from the traditional Longhorn characteristics that presumably affect ease of calving.

Bulls were selected from several herds representing each breed. Attempts were also made to utilize bulls from different breeding lines within each breed. Nine Angus, eight Gelbvieh and eight Texas Longhorn bulls were used as sires during the course of this study.

Results and Discussion

Calving success. As shown in Table 1, Texas Longhorn matings resulted in improved (lower) dystocia scores, a much reduced percentage of heifers requiring assistance at calving and a larger proportion of live calves at weaning, as compared to the other two sire breeds.

Births of heifer calves resulted in a significantly lower dystocia score (1.44 vs. 2.06) and required assistance less than half as frequently as did births of bull calves (20% vs. 42%).

Table 1. Calving success measures.

Sire Breed	Texas Longhorn	Angus	Gelbvieh
Number of Births	71	91	83
Mean Dystocia Score*	1.21 (a)	1.76 (b)	2.12 (b)
% Requiring Assistance	11 (a)	32 (b)	45 (b)
% Live Calves at Weaning	99 (a)	91 (b)	88 (b)

Means in the same row followed by different letters are significantly different ($P<.05$).

* Dystocia scoring system: 1 = no assistance; 2 = aid given, may not have been necessary; 3 = moderate difficulty; 4 = difficult pull; 5 = fetotomy or C-section.

Calf birth weights vary among sire breeds according to a trend similar to that of the calving difficulty measures, but they are less consistent among years (Table 2). Texas Longhorn cross calves are lighter at birth than are calves sired by Angus or Gelbvieh bulls. The difference is statistically significant ($P<.05$) except in year 1.

Calving success measures also varied among years in this study. Dystocia score and the proportion of heifers requiring assistance were lowest in year 1 and highest in year 3 (Table 3). Interestingly, the years with more calving difficulty corresponded to those of highest precalving heifer weights. The heifers may have been overly fat for most efficient calving during the third and fourth years of the study.

Calf growth to weaning. During the four years of the study, steer and heifer calves averaged 423 and 401 pounds at weaning, respectively. Gains to weaning favored Angus cross and Gelbvieh cross calves over Texas Longhorn crosses (Table 4).

Table 3. Calving measures and heifer weights over four years.

Year	1	2	4	3
Number of births	52	70	49	74
Mean dystocia score	1.46 (a)	1.59 (a)	1.69 (ab)	2.05 (b)
Heifers requiring assistance, %	21(a)	26 (ab)	29 (ab)	42 (b)
Mean precalving heifer weight, lbs	804 (a)	925 (b)	949 (b)	997 (c)

Means in the same row followed by different letters are significantly different ($P<.05$).

Table 4. Weaning weight (pounds).

Texas Sire breed	Longhorn	Gelbvieh	Angus
Number of calves	70	68	85
Weaning weight	387 (a)	421 (b)	421 (b)
205 day adjusted weight	367 (a)	391 (b)	400 (b)

Means in the same row followed by different letters are significantly different ($P<.05$).

Calving time. Time of feeding may affect the time of day at which cows calve. During the four years of this study, we supplemented the heifers late in the day (just prior to 6 p.m.) in an attempt to cause them to postpone calving until morning.

This was not a primary objective of this study, and the results can not be directly evaluated. However, as seen in Table 5, the twelve-hour periods with the most daylight hours did produce more calvings. The ideal time period for calving would be the 6 a.m.

CALVING ASSISTANCE

Gerard J. Koenig D.V.M., M.S.

Introduction

The optimal goals when offering calving assistance are to maintain the health and fertility of the dam and attain a healthy, viable calf. Reaching these goals is dependent on knowing when to offer aid, determining the cause of the problem, and the best method of resolving the problem.

Normal

Calving progresses in three stages.

Stage 1-The uterus begins contractions and the cervix dilates.

> Outward signs include: Dams go off feed, lie down and get up frequently, standing with an arched back and raised tail, and intermittently straining. Heifers may show signs of colic (looking at flank, kicking at belly). This stage normally lasts 1-4 hours.

Stage 2-The calf enters the birth canal, the cow breaks the "water bag". Active labor takes place. The front feet appear first with the soles pointed down. The nose and head soon follow with the lower jaws resting directly on top of the legs. Dilation of the birth canal often moves slowly until the head passes the vulva. The pace often picks up after reaching this point.

> Outwardly, the cow shows abdominal contractions. The calf is slowly expelled from the dam. Intermittent contractions and rest periods serve to slowly dilate the birth canal. In cows, this stage normally lasts from 30 minutes to 1 hour. In heifers, this stage may last for 3 or 4 hours.

Stage 3-The dam expels the afterbirth, and the uterus and cervix contract to a smaller size. The afterbirth is normally expelled in a few hours, while the cervix and uterus slowly contract over a period of days to weeks.

Abnormal

Dystocia is defined as abnormal or difficult birth.

General causes of dystocia and some examples include:
- Heredity-Twinning, "double muscling", "freak" calves;
- Nutrition-Low: Retarded body and pelvic growth;
  - High: Excess fat in pelvis;
- Management-"Accidental" breeding; too small or too young;
- Infections-Abortion diseases;
- Injury-Fractured pelvis, hernias;
- Miscellaneous-Posture of calf (flexed leg, neck, backwards);
- Maternal cause-Disparity between fetus and pelvic size.

The last category is considered the major cause of dystocia in heifers. Deciding when assistance should be given may be a difficult decision. It is often not known when the dam started into labor. As a rule of thumb, outside help should be given if the first stage of labor exceeds 6 hours or if the second stage of labor exceeds 1 hour in a cow or 3 hours in a heifer. Once the calf can be seen, there should be slow but steady progress through the birth canal. If normal progress grinds to a halt, assistance should be considered.

Examination

Determining the cause of the problem requires a thorough examination of the reproductive tract. It should always be remembered that you will be working with living tissues. Patience, cleanliness, and gentleness are critical to the reproductive future of the dam and the viability of the calf.

Prior to the examination, the cow should be properly restrained on a halter or in a chute. The calving area should be a well-bedded stall or pen, or a clean, dry, grass pasture. The tail should be held out of the way by an assistant or tied to the neck or front leg of the cow. The area around the vulva and any exposed parts of the calf should be thoroughly cleaned with a mild soap and warm water. The examiner should use sterile, disposable obstetrical sleeves, if possible, or wash hands and arms thoroughly with soap and water. A sterile water-based obstetrical lubricant or plenty of clean water should be applied before the examination.

The examination will determine if the pelvic size is adequate and if the cervix and vulva have dilated adequately to allow for passage of the calf. The position of the calf should be determined (i.e. front feet and head first vs rear feet first). Abnormal limb or head position (i.e. head back, one leg back or breech position) can be determined during the examination. More than two feet in the birth canal should make the examiner suspicious of twins or "freak" calves.

The calf should be examined for signs of life. Movement of the feet and tongue during manipulation are good signs. It should be noted that a calf may show no movement yet be normal. Passage of the afterbirth before delivery, palpation of a dry calf with loss of hair, hooves falling off, an abnormal smell, and emphysema (gas under the skin) of the calf are all signs associated with premature death. If the calf is dead, the immediate well-being and the reproductive health of the dam should be the primary consideration.

Calving difficulties in heifers are usually due to fetal-pelvic disparity. The pelvis is too small in relation to the size of the calf. Examination of these animals usually reveals normal position of the calf unless the disparity is severe.

Calf pulling

Once it has been decided to pull a calf, the future health of the cow and the calf is dependent on proper technique. The force of the pull should be spread out over a greater surface area by placing a loop of the chain above the pastern **and** fetlock joints to decrease the likelihood of fracture of the lower legs or damage to the hoof. It is also important that the direction of the force be applied in a downward manner or severe tears of the vulva or rectum of the dam may result.

The amount of force applied should be moderate and never exceed the pulling strength of two men. Traction should be slow and applied intermittently. **Trucks and farm tractors should never be used to provide pulling force!**

Calves that are coming backwards need to be pulled more rapidly once the birth canal is properly dilated. As the hips of the calf are passing through the birth canal, the umbilical cord will be stretched. Breakage of the umbilical cord stimulates the calf to begin breathing. If the head is still inside the dam, the calf may suffocate. Depending on how quickly the calf can be pulled, it may be perfectly normal or may need its upper airways cleared of mucus.

Calves that are coming forward can also present problems. The hips of the calf may lodge tightly in the dam's pelvis - a condition known as "hiplock". The birth canal is wider in the vertical axis than in the horizontal axis. Slow rotation of the calf (about 90 degrees) as it is pulled from the cow will bring the hips through the widest part of the pelvis and can prevent this problem.

Ranch economics often determine what strategy is taken. Veterinary assistance should be considered at any point if you are uncertain of the cause or management of the dystocia, if it appears that the life of either the calf or dam are in jeopardy, if the potential economic value of the calf or the cow is very high, or if no progress is being made with present methods. Depending on the circumstances, your veterinarian may be able to correct the reason for the dystocia or perform a Cesarean-section or fetotomy. Occasionally, a decision must be made as to which is more valuable, the dam or the calf, and the strategy changed accordingly.

PELVIMETRY

Gerard J. Koenig D.V.M., M.S.

Introduction

The best method of dealing with calving problems is to avoid them. Calving ease bulls and pelvimetry are some of the more recent tools to consider in a breeding program.

Research has shown that the internal pelvic area is one of the best predictors of dystocia in heifers. The best time to predict dystocia in heifers is before they are bred as yearlings. Pelvic area increases linearly from 9 to 24 months of age with a correlation of 0.70 between yearling and 2-year-olds. This trait appears to be moderately to highly heritable and will increase with selection.

Two types of pelvimeters are used:the Rice pelvimeter, which is a metal caliper-type instrument, and the Bovine Pelvic Meter, which is a plastic hydraulic-type meter with a syringe-like recorder.

Procedure heifers and bulls

Animals to be tested should be restrained in a chute. The rectum is evacuated of feces and the instrument is carefully carried into the rectum. Measurements are taken of the horizontal axis at its widest point and in the vertical axis at its most narrow point. The measurements are read in centimeters and then multiplied to give the pelvic area in square centimeters (cm^2).

The pelvic area ($cm^{2)}$:birth weight (lb) ratio should be 2:1 or greater in yearling heifers to avoid dystocia. A yearling heifer with a pelvic area of 140 cm^2 should have minimal difficulty calving as a 2-year-old if the calf weighs 70 lbs or less. A heifer with a pelvic area of 120 cm^2 should have minimal difficulty if its calf weighs 60 lbs or less. This heifer would probably experience moderate difficulty with a 70 lb calf (1.7:1 ratio) and would probably require a cesarean section if the calf weighed 80 lb (1.5:1 ratio).

Pelvimetry can be done at preg checking or just before calving. The pelvic area $^{(\text{in cm}}2)$ can be divided by 2.5 if the heifer is 18-19 months of age, and divided by 3 at age 23-24 months, to give the estimated calf weight (in lbs) where calving difficulty will be minimal.

Pelvimetry has been used for bull selection. Selection for large pelvic area in bulls results in increased pelvic size in their daughters without increasing birth weight. If both bulls and heifers are selected for pelvic size, a herd with a large pelvic area can be developed.

Calving-ease bulls, or selecting bulls for very low birth weights, costs the producer money because of corresponding lower weaning weights. Pelvimetry may allow you to exploit the positive correlation between birth weights and yearling weights. It should be remembered that pelvic areas for bulls are smaller than heifers at the same weight.

Culling guidelines

No hard and fast rules have been established, but it is felt that a 650 lb yearling heifer should have a pelvic area of at least 130 cm^2 (to be able to deliver a 65 lb calf as a two-year-old). One practitioner feels that all yearling bulls with a pelvic area under 180 cm^2 should be culled.

Implants

Implantation of heifers results in a greater percentage of heifers that exceed minimum pelvic size criteria as compared to nonimplanted heifers. Heifers should be implanted at branding time only. Implanted heifers had pelvic scores that averaged 16.8 cm^2 larger in one study. This suggests that fewer dystocias should result in heifers that have been implanted.

REFERENCES

Deutscher, G.H. 1987. Reducing dystocia with pelvic measurements of heifers and bulls. Presented to the Colorado Veterinary Association. p 1-6.

Fitzgerald, M. 1987. Culling by pelvis size can be final step to calving ease. Drovers Journal. Aug 13.

Hausman, G. 1989. Improving the heifer selection process. Large Animal Veterinarian. p 40-46.

Wolverton, D. J., Perkins, N.R. and Hoffsis, G.F 1991. Veterinary application of pelvimetry in beef cattle. Compendium on Continuing Education. Vol 13 (8), p 1315-1320.

REPRODUCTIVE FUNCTION AND FEEDLOT PERFORMANCE OF BEEF BULLS, STEERS OR BULLS ACTIVELY IMMUNIZED AGAINST GnRH: EFFECT OF SYNOVEX S

E. Adams, C.A. Daley, B.M. Adams and H. Sakurai

INTRODUCTION

Testicular development in beef cattle is a product of a hormonal cascade. The hypothalamic decapeptide, **gonadotropin-releasing hormone** (GnRH), appears to play a critical role in the endocrine events leading to reproductive competence. Indeed, the increase in luteinizing hormone (LH) secretion that heralds the onset of testicular maturation in bull calves is associated with concurrent increase in secretion of GnRH. Similarly, the sequence of endocrine changes that presage puberty in bull calves is accelerated in animals receiving GnRH injections. Conversely, immunoneutralization of GnRH suppresses gonadotropin secretion, retards testicular development and inhibits spermatogenesis.

Active immunization against GnRH has been proposed as a humane alternative to surgical castration in cattle and other domestic species. Although immunization of bulls against GnRH is reported to retard gonadal development and depress testosterone secretion, individual animal responses are highly variable and the effect of immunization is short-lived. We have demonstrated that the GnRH-keyhole limpet hemocyanin (KLH) conjugate is an effective immunogen in sheep and beef cattle. In these studies, the GnRH-KLH conjugate was shown to induce a rapid and persistent increase in antibodies directed against GnRH. In beef heifers and ram lambs, the appearance of antibodies against GnRH led to decreased gonadotropin secretion and attenuated growth and function of gonadal tissue.

In our current study, we are examining testicular function and feedlot performance in bull calves vaccinated against GnRH at 3-4 months of age. In addition, the effect of anabolic steroid containing implants on feedlot performance and carcass traits of bulls actively immunized against GnRH is being evaluated.

MATERIALS AND METHODS

Ninety-one fall-born bull calves from the Sierra Range Field Station were randomly assigned by dam age and birth date to one of six cells in a 2 x 3 factorial experiment. The factors of interest in this experiment were anabolic steroid supplementation and gonadal status. The 2 classes were: (1) unimplanted, and (2) implanted with Synovex. The 3 treatments were: (1) untreated bulls (BULL) or bulls, (2) actively immunized against GnRH (ANTI-GnRH), or (3) castrated (STEER) at 3-4 months of age.

Calves assigned to treatment 1 (BULL; n = 30) served as control animals. Animals in treatment group 2 (ANTI-GnRH; n = 31) were actively immunized against GnRH. Animals assigned to treatment 3 (STEER; n = 30) were castrated. The mean age of calves at castration or immunization (processing) was 110 d. Animals assigned to class 2 (n = 46) received Synovex-C at processing. Animals in class 1 did not receive Synovex. Calves remained at the Sierra Field Station until weaning. Calves were housed at the beef facility on the UC Davis campus during the growing phase and were fed a ration composed primarily of chopped hay. The cattle were transferred to the feedlot facility on the Davis campus at approximately 12 mo of age. During the period of feedlot confinement, bulls in a class x treatment group were housed in a common pen (11.5 m x 19 m, with 11.5 m of available bunk space). During the first 56 d of feedlot confinement, the animals had free access to an intermediate energy ration primarily composed of chopped alfalfa (36%) and oat (12%) hay, cracked corn (42.5%), molasses (6%) and cottonseed meal (2.5%). During the final 2 months of confinement, the bulls were fed a high-energy ration consisting of rolled wheat (70%), chopped alfalfa (8%) and oat (8%) hay, molasses (10%) and animal fat (2%).

Blood samples were collected and animal weight and scrotal circumference determined at castration or immunization, weaning, and periodically during the growing and finishing phases. Animals in treatment group 2 (ANTI-GnRH) received a booster immunization 9 mo after primary immunization. Animals in class 2 received Synovex-S implants at weaning and feedlot entry. Masculinity was assessed within 1 wk of slaughter by a 5-member panel. Each animal was evaluated individually and ranked on a scale of 1-10, with 10 being most masculine. Masculinity was assessed on the basis of the appearance of the head, neck, forearm and jump muscle and overall body proportions. Members of the panel were asked to disregard scrotal size. Sperm concentration in testes collected at slaughter was also evaluated.

Animals were slaughtered at a commercial abattoir 116 d after feedlot entry (mean age = 68.6 ± .3 wk); carcass and testicular weight determine slaughter. Ribeye area and backfat thickness was measured at the 12th rib. Quality, yield grades and marbling were evaluated by a USDA meat grader. Serum concentration of testosterone was determined by radioimmunoassay. The percentage of ^{125}I-GnRH bound by 0.1 ml of a 1:100 dilution of serum was used as a measure of anti-GnRH antibody level (titer).

RESULTS

ANTI-GnRH TITER. All bull calves immunized against GnRH at 3-4 months of age developed significant anti-GnRH antibody levels (titer) by weaning. Anti-GnRH titer remained elevated throughout the post-weaning period. Anti-GnRH titer levels at weaning and slaughter in bulls immunized against GnRH were 45.9 ± 2.8% and 42.7 ± 3.4%, respectively. Antibodies against GnRH were not evident in unimmunized bulls or steers.

SCROTAL CIRCUMFERENCE. Both immunization and Synovex implants significantly depressed scrotal circumference in yearling bulls, with the combined effect being significantly greater than the effect of either treatment alone (Table 1).

SERUM CONCENTRATIONS OF TESTOSTERONE. Immunization against GnRH resulted in significant depression of serum concentrations of testosterone at weaning and during the growing phase relative to testosterone concentrations in unimmunized bulls. At slaughter, serum concentration of testosterone were reduced by 70% in bulls immunized against GnRH, relative to testosterone levels in unimmunized bulls. Although the residual level of testosterone in yearling bulls immunized against GnRH was higher than the testosterone level in steers (Table 1), this difference was not significant.

SPERMATID RESERVES AND TESTICULAR WEIGHT. Testicular weight in yearling bulls was significantly depressed by treatment with Synovex or immunization against GnRH. Combining Synovex treatment with immunization reduced testicular weight even further. Testes weight at castration at 3-4 mo of age was 6.5% of testes weight of yearling bulls at slaughter (Table 1). Sperm concentration in testicular tissue collected at slaughter was significantly depressed by treatment with Synovex or active immunization against GnRH. Like scrotal circumference and final testicular weight, sperm concentration was further reduced ($P < .05$) in immunized bulls carrying Synovex implants.

MASCULINITY SCORE. The apparent masculinity of yearling bulls was greater ($P < .05$) than the masculinity of steers or immunized bulls and was not influenced by Synovex (Table 1). Conversely, the masculinity of implanted steers was significantly higher than masculinity of unimplanted steers. The masculinity of immunized bulls was intermediate between yearling bulls and unimplanted steers.

ANIMAL WEIGHT AND FEEDLOT GAIN. Although neither Synovex S, castration nor immunization treatments had a significant effect on weight at feedlot entry, final live weight and carcass weight were significantly affected by both Synovex and treatment (Table 2). When contrasted with comparable weights of immunized or unimmunized bulls, final weight and carcass weight were significantly lower in unimplanted steers. Conversely, the final weight and carcass weight of steers implanted with Synovex did not differ ($P > .05$) from the final weight and carcass weight of immunized or unimmunized bulls. Dressing percentage was not affected by treatment or administration of steroid-containing implants.

Weight gain during the period of feedlot confinement was higher ($P < .05$) in unimmunized bulls than in steers and immunized bulls (Table 2). Synovex implants improved feedlot gain of steers ($P < .05$) but had no significant effect on feedlot gain of immunized or unimmunized bulls.

CARCASS TRAITS. Although dressing percentage, marbling, and backfat thickness were not affected by treatment, ribeye area was larger ($P < .05$) in bulls than in steers or immunized bulls (Table 3). Ribeye area was also significantly greater in immunized bulls than steers. This effect of treatment on ribeye area, coupled with the lower level of KPH fat in bulls, translated into a better yield grade for bulls than steers. The yield grade of immunized bulls was intermediate between bulls and steers.

CONCLUSIONS

The results of this study indicate that vaccination of bull calves against GnRH suppresses testicular development and function. Such vaccination also retards expression of secondary sex characteristics such as change in scrotal circumference and masculinity. Although not measured, sex-linked behavioral characteristics, such as aggressiveness, may also be depressed in immunized bulls.

Although serum concentrations of testosterone were depressed in immunized bulls relative to levels in untreated bulls, residual testosterone secretion continued at a level that was higher than that noted in steers. This persistent exposure to the endogenous anabolic steroid, albiet at levels significantly lower than in unimmunized bulls, may account for the improved gain and carcass traits of immunized bulls relative to steers. Resdiual testosterone secretion may also account for the failure of exogenous steroid (Synovex S) to affect feedlot performance or carcass traits of immunized bulls.

Taken together, these data indicate that immunization against GnRH may have practical utility as a noninvasive alternative to surgical castration in the management of beef cattle. In addition, the residual levels of testosterone secretion from the testicular tissue of immunized bull calves may have anabolic effects that will reduce the need for supplementation with exogenous steroid implants.

TABLE 1. REPRODUCTIVE FUNCTION IN YEARLING BULLS: EFFECT OF CASTRATION (STEER) OR ACTIVE IMMUNIZATION AGAINST GnRH (ANTI-GnRH) AND SYNOVEX (I) IMPLANTS.

TREATMENT	N	SCROTAL CIRCUM-FERENCE (cm)	TESTES WEIGHT (gm)	TESTO-STERONE (ng/ml)	MASCULINITY SCORE	SPERMATID RESERVES ($x10^6$/gm)
BULL	15	36.5[a]	468.0[a]	3.27[a]	7.8[a]	32.3[a]
BULL + I	14	33.1[b]	343.5[b]	3.53[a]	7.2[a]	16.4[b]
Anti-GnRH	15	31.6[b]	261.7[b]	0.93[b]	5.5[bc]	12.1[b]
Anti-GnRH + I	16	27.5[c]	133.7[c]	0.60[b]	5.7[b]	3.4[c]
STEER	15	---	---	0.07[b]	4.2[c]	---
STEER + I	14	---	---	0.05[b]	2.7[d]	---
SD		4.0	126.4	1.67	2.0	11.5

[a,b,c,d]Values in a column that do not share a common superscript differ ($P < .05$).

TABLE 2. FINAL AND INTERMEDIATE WEIGHT OF UNTREATED BULLS AND BULLS CASTRATED OR IMMUNIZEDAGAINST GnRH AT 3-4 MONTHS OF AGE (PROCESSING). HALF OF THE ANIMALS WITHIN EACH TREATMENT GROUP (BULL, STEER, OR ANTI-GnRH) RECEIVED SYNOVEX IMPLANTS (I) AT PROCESSING, WEANING AND FEEDLOT ENTRY.

TREATMENT[1]	PROCESSING[2] (lb)	WEANING[2] (lb)	FEEDLOT ENTRY[3] (lb)	FINAL WEIGHT[3] (lb)	FEEDLOT GAIN[4] (lb)	CARCASS WEIGHT (lb)
BULL	232.3	505.7	688.1^{abc}	1120.2^{ab}	432.1^{ab}	678.3^{ab}
BULL + I	250.5	541.3	732.0^{a}	1182.4^{a}	452.1^{a}	716.8^{a}
ANTI-GnRH	266.1	526.3	716.4^{ab}	1096.3^{b}	379.9^{c}	664.5^{b}
ANTI-GnRH +I	239.0	505.1	675.5^{bc}	1079.8^{b}	404.2^{bc}	660.2^{b}
STEER	235.6	489.3	650.6^{c}	987.0^{c}	336.4^{d}	590.5^{c}
STEER + I	273.3	527.5	716.9^{ab}	1103.4^{b}	388.9^{c}	672.6^{ab}
Residual SD	48.7	55.8	67.4	96.8	50.2	65.6

[1]Mean.
[2]Full weight.
[3]Shrunk weight.
[4]Total gain during during 113 day period of feedlot confinement.
[a,b,c,d]Values in a column that do not share a common superscript differ ($P < .05$).

TABLE 3. EFFECT OF SYNOVEX S ON CARCASS TRAITS OF BULLS, STEERS AND BULLS ACTIVELY IMMUNIZED AGAINST GnRH.

TREATMENT[e]	No.	DRESSING %	RIBEYE AREA, in^2	MARBLING SCORE[f]	BACKFAT THICKNESS	KPH[g]	YIELD GRADE
BULL	29	60.5	14.1^{a}	3.9	.37	1.5^{a}	1.9^{a}
ANTI-GnRH	31	60.9	13.2^{b}	4.0	.36	1.7^{b}	2.0^{ab}
STEER	29	60.3	12.2^{c}	4.2	.39	1.7^{b}	2.3^{b}
P-value		> .05	< .0001	> .05	> .05	< .05	< .05
IMPLANT	44	60.9	13.2	4.1	.41	1.6	2.2
No IMPLANT	45	60.3	13.1	4.0	.38	1.7	1.9
P-value		> .05	> .05	> .05	< .05	> .05	< .05
BULL	15	60.5^{ab}	14.4^{a}	3.8^{a}	.33	1.5^{a}	1.6^{a}
BULL + I	14	60.6^{ab}	13.8^{ab}	4.1^{ab}	.42	1.6^{ab}	2.2^{b}
ANTI-GnRH	15	60.6^{ab}	13.2^{bc}	3.9^{ab}	.34	1.6^{ab}	2.0^{b}
ANTI-GnRH + I	16	61.1^{a}	13.2^{bc}	4.1^{ab}	.37	1.8^{bc}	2.1^{b}
STEER	15	59.7^{b}	11.8^{d}	4.1^{ab}	.35	1.9^{c}	2.2^{a}
STEER + I	14	61.0^{ab}	12.7^{c}	4.2^{b}	.44	1.6^{ab}	2.4^{b}
Residual SD		1.6	1.3	.5	.14	.3	.6

RESPONSIBLE ANIMAL CARE PRACTICES?

Wayne Jensen

There are many practices used in the production of beef cattle in California. Many of those used today are similar to those that have been practiced for decades - branding, castrating, and dehorning. There hasn't been a need to change these practices or others during the years, but the possibility may exist in the future. With the changes in the population, there are now fewer people and who understand animal agriculture and are challenging many of the practices used to produce food animals.

Individuals and organizations with interests in animal rights and/or animal welfare are actively working to make changes. Their issues vary from environmental and dietary to the welfare of animals and can involve wildlife, laboratory animals, companion animals and animals used in agriculture. The methods used to accomplish change are varied and can include the legislative process.

It is not surprising to learn there are people who challenge the practices used today. For example, many of the routine practices used in processing cattle appear to cause pain and be stressful to the animal. While pain and/or stress is difficult to measure quantitatively, most people can agree that one or both can occur during many of the management practices used in cattle production.

While there can be agreement that pain or stress does occur, the difficulty comes in trying to understand why the practice is used or is needed. What is considered by a producer to be a necessary practice, an uninformed individual might consider it to be an abuse. The difference is knowing why the practice is needed.

There are practices, such as vaccination, dehorning, and castration, that cause pain which can be short-term stressors. Others, such as weaning, moving to another pasture, restraining in a squeeze, also can cause short-term stress. While causing stress for a short period, these practices can be considered beneficial stressors. They will provide long-term health and management benefits to individual animals and others in the herd by alleviating the long-term stress from injury, disease or nutritional factors.

It is difficult to suggest specific guidelines addressing all the animal care practices needed for the production of beef in California due to the geographical and climatic conditions, as well as the differences that occur in the types of cattle operations. However, it is important to consider the need to be responsible for the practices used and perform them in a manner which reduces or eliminates stress or pain whenever possible to prevent mandated animal care guidelines being implemented for the beef industry.