THE UNIVERSITY OF CALIFORNIA
SIERRA FOOTHILL
RESEARCH & EXTENSION CENTER

BEEF, RANGE & HISTORY FIELD DAY

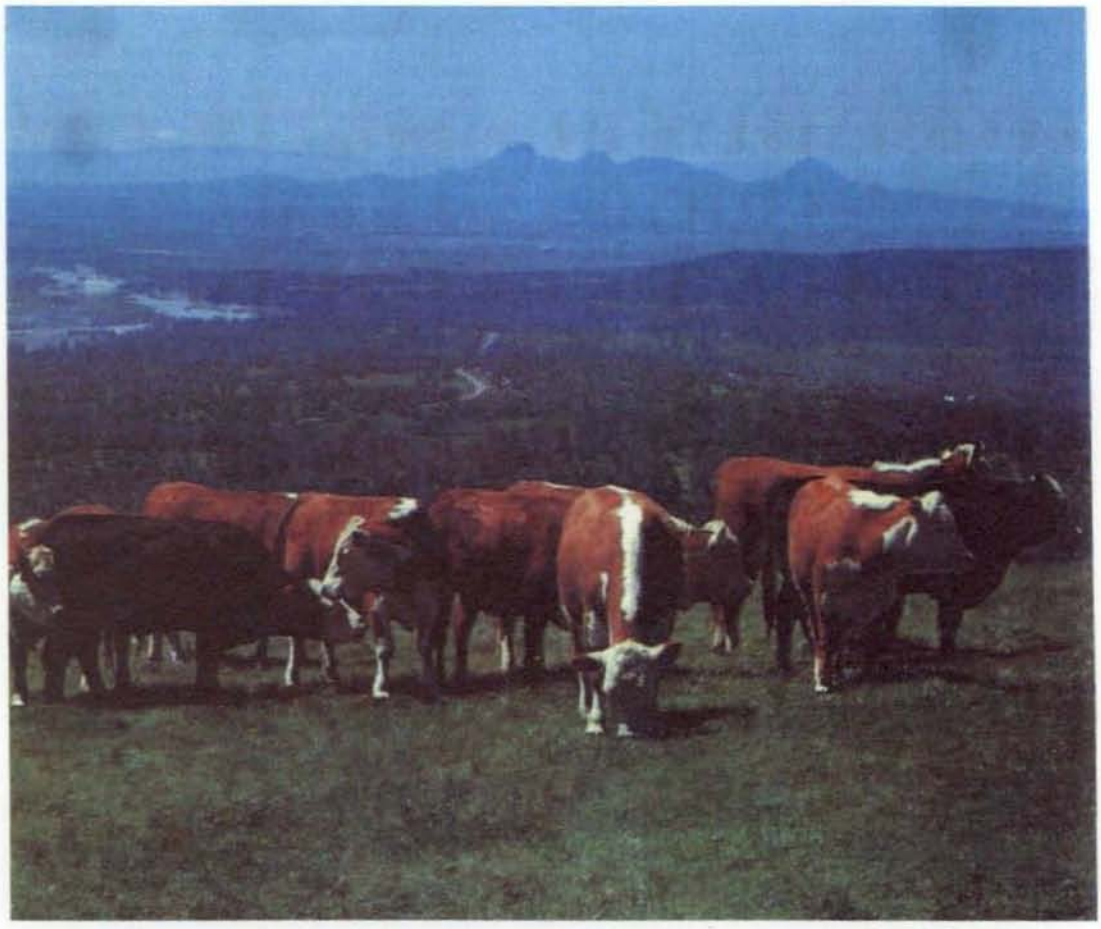

Photo by C. A. Raguse

APRIL 18, 2002
BROWNS VALLEY, CALIFORNIA

Groundbreaking ceremony for the "New Headquarters", May 1966. From the left: Unknown, unknown, Joe Guild (Station Superintendent); Prof. R. Merton Love (Chair, Agronomy & Range Science Dept., UC-Davis); James L. (Lowell) Myler (Director, Agricultural Field Stations); unknown.

SFREC Crew, 2000. Front row, left to right:: Gary Childers, Dave Labadie, Chris Feddersen, Ed Coffin, Mike Connor (Superintendent). Back row: left to right:: Martin Beaton, Tim Clark, Lew Heflen, Tammy Karnow, Abraham Mendoza, and Doug McCreary (UCB).

THE UNIVERSITY OF CALIFORNIA
SIERRA FOOTHILL RESEARCH & EXTENSION CENTER

Presents:

Annual Beef & Range Field Day

COSPONSORED BY:

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
DEPARTMENT OF ANIMAL SCIENCE, U.C. DAVIS
VETERINARY MEDICINE EXTENSION, U.C. DAVIS

APRIL 18, 2002

BEEF & RANGE FIELD DAY

UC Sierra Foothill Research & Extension Center

APRIL 18, 2002

AGENDA

Master of Ceremonies – Marc Horney, Livestock & Natural Resources Advisor, UCCE Colusa/Glenn/Tehama

9:00am	Registration ($15 includes lunch & proceedings) – UC DavisYoung Cattlemen
9:30am	Welcome – Mike Connor, Superintendent, UC-Sierra Foothill Research & Extension Center (SFREC)
9:35am	Diamond in the Rough (SFREC History) – Charles A. Raguse, Professor Emeritus, Agronomy & Range Science, UC Davis
9:45am	The Basics of Direct Marketing – Roger Ingram, Farm & Livestock Advisor, UCEE Placer/Nevada Counties
10:00am	Experiences in Direct Marketing of Beef – Jim Gamble
10:20am	Direct Marketing Beef in Farmers' Markets – Tyler Dawley
10:40am	Developing Alternative Marketing Programs – Dave Daley, Professor, Animal Science, CSU - Chico
11:00am	Alternative Markets Panel Discussion – Ingram, Gamble, Dawley, Daley
11:20am	Growing/Finishing Systems – Roberto D. Sainz, Assoc. Professor, Animal Science, UC Davis
12:00noon	**LUNCH – Tri-tip BBQ** served by Yuba-Sutter Cowbelles & SFREC Staff. During Lunch: CCA Officers Industry Update
1:30pm	Ranch Biosecurity Considerations – John Maas, Veterinarian, Vet. Med. Extension, UC Davis
1:45pm	Forage Management and Strategic Supplementation Effects on Rebreeding and Weaning Weights – James Oltjen, Management Systems Specialist, Animal Science Dept., UC Davis
2:05pm	**Breakout Sessions** (Choice of two 20 min. sessions) Cattle Health – John Maas, Veterinarian, Vet. Med. Extension, UC Davis Feeding Rice Straw to Cattle – Glenn Nader, Livestock & Natural Resources Advisor, UCCE Butte/Sutter/Yuba Counties Fenceline Weaning of Beef Calves – Ed Price, Professor, Animal Science Dept., UC Davis

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DIAMOND IN THE ROUGH
A History of the UC Sierra Field Station[1]

OPENING REMARKS BY THE WRITER - - - You may wish to skip this

I was born and raised in Wisconsin. My first quarter-century was spent on a small dairy farm. My father believed in the virtuosity of hard work. I didn't. So, eventually, I went off to College (UW at Madison), emerged with a doctorate, and was hired in 1964 (by R. Merton Love) to work in the Agronomy Department at UC Davis.

In 1965 I was introduced to the (then) Sierra Field Station. Time passed. I retired from active duty with the University and the Department of Agronomy & Range Science in 1993. During the intervening 28 years the Sierra Field Station was a major part of my life, with the research and teaching conducted there, or evolving from it, to be done in the classrooms, laboratories, and greenhouses at Davis. The amenities that existed by virtue of the Station's location were not the least of the combination. The Timbuctoo Bend of the Yuba River (where good friend Harvey Leech instructed me in the art of extracting gold from the river with a miner's pan), Engelbright dam and reservoir, Beale Air Force Base (with its awesome SR-71 "Blackbird"), the Hammonton dredger fields, and the Sutter Buttes, together formed a constellation of rich satellite values.

Research-program-wise, the Station began as a product of its times, and evolved with them. One of the more rewarding features of this writing will be the documentation and re-creation of that evolution.

The roots of those influences extended far afield in a geographical dimension, and back many decades in time. The soil in which they were nourished was the most general sense of "Agriculture", leavened increasingly by the newer (but also applied) science of ecology. Organizationally, the trunk formed by this evolution leads directly back to Justin S. Morrill and the legislation that created the State Experiment Stations and Land Grant colleges. Locally, and of course more recently, the connection is to the San Joaquin Experimental Range (**SJER**) (at Coarsegold, near Fresno, CA), established and operated by the U.S. Forest Service, from whence the **Sierra Field Station** originated when UC and the Forest Service parted company.

In the end, the physical facilities of the Station, and the "faces" it turns to its publics, are the "algebraic sums" of the real and perceived needs of agriculture over 40-some years, and the influences of numberless people, each acting upon his or her heartfelt convictions about what constituted productive research, teaching, and administration. **This, together with the people of the Station itself, who collectively, over all these years, sought to respond, effectively and with sincerity, to the requests put before them..**

Charlie Raguse

Acknowledgements:

First, Thanks to Linda, my lovely, patient and long-suffering wife, who "lost" a husband when I began this project, completion of which is yet many months away. Her encouragement has been a valued contribution. *Second*, Thanks to Brad Sickler and Brian Monroe, computer specialists par excellence in the UC Davis Agronomy & Range Science Department, for absolutely indispensable counsel and assistance. Their help in scanning of 35mm slides and manipulation of the images therefrom get the lion's share of the credit for the color illustrations on the Field Day brochure covers. *And*, Thanks to the SFREC Crew, which includes Mike Connor, for much, much help and support to my research, teaching, and extension activities over all these years. Cheers!

[1] Title of a new book now being written by Charlie Raguse

BEGIN READING (or re-begin) ..... NOW!

There is not a precisely-defined moment at which this Station began. Its pre-1960 history dribbles back to a U. S. Forest Service research facility near Coarsegold, in Madera County. There was a cooperative research program in which both the Forest Service and the University of California participated. Davis departments working there included Animal Science, Agronomy, Soil Science, and Zoology. Other agencies, both state and federal, were involved. Names still recognizable today included Hart, Guilbert, Howard, and Williams. Much good research was done, but it was clear there were administrative difficulties, and perhaps insufficient resources to go around. Somehow, I "inherited" a correspondence file from R. Merton Love (who was Chair of Agronomy during the transition of UC's research program from Madera Co. to Yuba Co.). Following is a portion of a key letter:

12/31/57

RESEARCH OPERATIONS AT USDA SAN JOAQUIN EXPERIMENTAL RANGE

Keith Arnold, Director, California Forest &Range Experiment Station, Forest Service, USDA
Paul F. Sharp, Director, California Agricultural Experiment Station, University of Calif.

.....

For the past twenty-five years cooperative research has been conducted on the federal San Joaquin Experimental Range of the California Forest and Range Experiment Station. In this joint activity, the University has been responsible for beef cattle, rodent, and some wildlife research. The California Forest and Range Experiment Station has done plant ecology, plant control, range management, wildlife, and other types of research. The Agricultural Research Service has worked on fertilization and other agronomic studies. Some wildlife research, particularly with quail, rodents, and snakes, has been done by the U. S. Fish and Wildlife Service, California Department of Fish and Game, and other cooperating personnel.

There is need to continue and to expand research centered around cattle in the Sierra Nevada foothill area. At the same time there is need for intensive grazing management studies. **In response to these needs, research programs have increased to the point where the San Joaquin Experimental Range is no longer adequate for the large-scale range research programs of both the University of California and the California Forest and Range Experiment Station. Separate areas and separate test animals must be used. (emphasis mine).**

.....

In 1961, Kenneth A. Wagnon, an Animal Science Specialist at the SJER, moved 48 grade Hereford cows remaining from the breeding herds at the SJER to the Animal Science Department at Davis. Meanwhile, concerted efforts were afoot

to find a new home for the "evicted" animals and research programs. At a meeting of the "Range Land Utilization Committee", the following exchange (as recorded by secretary James L. Myler[2]) took place:

> ***"Chairman Love stated that the reason for the meeting was for discussion of the need on the part of the University Research Staff for a Range Research Field Station in the Sierra Foothills, and that "Dr. Wellman[3] wished the counsel of this committee on this matter.***
>
> ***Cole[4] moved that a Sierra Foothill Range be obtained. Biswell seconded the motion. The motion passed by a unanimous vote.***
>
> ***Dr .Sharp suggested that since the committee felt that such a range acquisition was essential, they should attempt to set up specifications and criteria for its selection."***

The minutes then listed eleven such specifications and criteria. I believe they are of sufficient interest to list below:

(1) The site should be representative of a comparatively large segment of the State's range area.
(2) It should be of a different type than the granite soil as represented on the SJER.
(3) It should have varied elevations, perhaps going from 1000-1500 foot elevation up to 3500-4000 foot elevation.
(4) It should contain representative types including good grass land, woodland grass and brush; perhaps to include borderline timber sites.
(5) Area of range should be a minimum of 9000 and perhaps up to 15000 acres. (Committee will further study site size needs as dictated by departmental needs.
(6) It would be desirable to have a range site within a 100-mile radius of the Davis Campus for convenience of research staff.
(7) Preferably it should be near a town which offers possibilities of rental houses for staff and workers, to obviate the need of extensive University housing.
(8) It should contain one or more complete watershed units for hydrologic studies.
(9) It should cover a wide range of wildland problems, as does the Hopland Station.
(10) Not to contain large areas of serpentine soils, Heneke soils, or steep shale areas.
(11) (Considered a base area together with separate outlying areas, to achieve diversity.)

One of the prized items in my documents collection is a copy of a letter written by a third-generation land owner in Yuba County, Mr. Edwin A. Forbes, to Mr. Reuben Albaugh, an Animal Science Specialist. "Reub" had apparently inquired of Mr. Forbes as to history of the land that was, by this time, the "UC Sierra Field Station". For readers interested in the history of Yuba Co., this is a real gem.

WESTERN STATES MEAT PACKERS ASSOCIATION
604 Mission Street
San Francisco 5, California

October 7, 1960

[2] Director of Agricultural Field Stations
[3] Vice President of Agriculture, University of California
[4] Department of Animal Science, Davis

Mr. Reuben Albaugh
Extension Animal Husbandry
University of California
Agricultural Extension Service
Davis, California

Dear Rube:

This is in regard to the history of the Forbes ranch, about which I told you I would write you after my return from the Inter-Mountain area.

This ranch was originally started by my grandfather, Alexander R. Forbes, by homesteading 160 acres in Section 15, Township 16, Range 6 East MDBM, in 1874. At least, that is my understanding of the year in which he homesteaded this land. My father helped herd his father's cattle on that ranch when there were no fences and there were only a few homesteads.

Following the death of my grandfather in the 1880's, I don't know the exact year, my father and his brother Clarence purchased my grandfather's interest and they acquired other pieces of property, particularly the Clark ranch which is a part of the ranch which lies between our ranch house and the Yuba River. Today there is a field in that area where you will find fig trees and quince trees growing where the Clark ranch house was located.

My father and his brother also filed homesteads during this period and purchased other pieces of property, adding to their original homesteads. In 1902, my father, W. P. Hammon, and Byron Burris, Sr., acquired what is known as the Koch and Lewis ranches and the Johnson Brothers ranch. In 1930 my sister and I together with the Burris heirs, sold the Johnson Brothers ranch consisting of 1000 acres east of the Koch and Lewis ranches, to Tom Richards of Sacramento. Prior to this sale, my sister and I had acquired the one-fourth interest of W. P. Hamon in all of these lands, thus giving the Burris' interests one-half and Forbes interests one-half.

In 1912, my father purchased the Hendricks and Porter ranches comprising 710 acres, and also the Louie Delagne ranch of 20 acres, and the Lawrence Gardella ranch of 12 acres. In the 1920's my sister and I purchased 160 acres from the Central Pacific Land Company and 160 acres from Mrs. Pendola. In 1926 I purchased 240 acres from the Schubert Estate. With all of these purchases put together, it made the present ranch of 5,014 acres, which the University purchased.

In 1896 my father was instrumental in founding the Browns Valley Irrigation District, making a 50 year contract with the Pacific Gas and Electric Company, in which they utilized 10,000 miner's inches of water over the wheels of the Colgate power house. The electric company at that time was known as the Coast Counties Gas and Electric Company, which was the forerunner of the present Pacific Gas and Electric Company. The Colgate powerhouse was named after Mr. Colgate of the Colgate Palmolive Company, who was the principal financial backer of the Coast Counties Gas and Electric Company.

In 1946 I negotiated with the Pacific Gas and Electric Company, at the expiration of the 50 year contract negotiated by my father, for the continuance of the water for the Irrigation District. This is the present lease under which the district is now operating, in which the PG&E has guaranteed in perpetuity 1890 miner's inches of water at the head of the main canal serving the District. In addition to this perpetual water right, I

secured a $175,000 cash settlement for the District for relinquishing some of the benefits that it had under the old contract.

From the death of my father on July 15, 1915 until June 1, 1960, I operated the ranch and built a cattle herd on it, as there were not any cattle at the time of my father's death as the ranch was leased out to other cattlemen. The ranch house which I have since remodeled was originally a store in 1850 at Foster's Bar on the Yuba River, which is located just above the present Park's Bar bridge on Highway 20. I made many improvements on the ranch, such as putting more land into irrigation, adding additional buildings and corrals, and other facilities for a working cattle ranch.

I do not have any pictures of the old days, nor do I know of any additional information that you might get from the County Library or other places, but you may be able to get information from the Recorder's office as to the exact dates of purchase of land and the transfer of any existing rights and ways, such as for power lines, etc., from the county records.

If you have any questions, I am sure that I will be able to give you the answers to them.

Kindest personal regards.

Very cordially yours,

E. F. Forbes
President and General Manager

Much of the Station's history is recorded in an unbroken series of annual administrative reports. Following is the first of such reports, written by Joe Guild, the first Station Superintendent. Among the bits and pieces of information, and between the lines, is evidence of the frustrations encountered in trying to operate a research field station "in the rough". Poor line fences and virtually no internal fences at all. The Jones and Marty properties barrier, and having to go to a neighbor, "hat in hand", so to speak, to drive between the two parts of the Station. The "Diamond" emerged slowly, and with much effort and expense, from its "Rough".

"This is the first report on annual operations of this field station and covers the 1960-61, 1961-62, and 1962-63 fiscal years. The area, formerly known as the Forbes Ranch, was acquired by the University on June 1, 1960. It consisted of two separated areas with the following acreages:

Koch and Lewis		1,604 acres
Home ranch	(Porter)	500 acres
	(Forbes)	2,910 acres
	Total	5,014 acres

The two parts of the ranch were separated by three parcels of land owned by the following persons: Jones – 80 acres, Marty – 700 acres and Selby – 2,100 acres. Access to the Koch and Lewis field is by road; however, the County road (Scott-Forbes) terminates on the Selby property where the road crosses the Browns Valley Ditch. At this point Mr. Selby has a locked gate through which the Browns Valley Irrigation District, State Division of Forestry, Pacific Telephone and Pacific Gas and Electric have rights of entry. While Mr. Forbes previously also had a right of entry, Mr. Selby would not allow the University to place a lock on the gate chain. Each time University

personnel wished to drive to the Koch and Lewis field they first had to go to Mr. Selby's ranch house to secure loan of a key to pass through the gate. Movement of livestock between the two areas is by trailing across the Marty property.

Most of the west boundary of the Koch-Lewis field is formed by Dry Creek even though two small parcels (Sections 4 and 28) extend to the west side of the creek and a greater amount of neighbor's property (Section 33) extends to the east side of the creek. While we do not use the small amounts of land on the west side of the creek, we do use the neighbor's property on the east side of the creek. While cattle are not supposed to be able to cross Dry Creek, University cattle have done so each year and to date we have lost 4 yearling steers. Similar situations exist in the Porter and Forbes fields. In the Porter field one corner (Section 8) is just across Dry Creek. Otherwise this field is completely fenced. In the Forbes field the Yuba River forms the east and south boundaries. To date no cattle have escaped across the river. Within this field are 4 or 5 small parcels of land that do not belong to the University. None are marked or fenced.

The present buildings, cattle working facilities, fences and University owned "farmers telephone" line to Smartville are quite old and in poor condition. The area was first surveyed in 1865 and only a few of the section and quarter-section corners have subsequently been remarked. Consequently, the locations of many of these points are unknown at present and there is doubt that all boundary fences are properly located. Due to the poor condition of these fences there has been some movement of cattle between University and neighboring property.

The ranch was previously operated on a cow and calf basis with the cattle moved off the ranch to leased irrigated pasture from June to October each year. Mr. Forbes reported that while the ranch carried 600 head of cattle in 1913, loss of forage from subsequent tree and brush encroachment had reduced the carrying capacity 50%. While the ranch contained several springs and seeps, none had been developed for stock watering purposes. The Koch and Lewis and most of the Forbes field were free from cross fencing.

About 100 acres of land had been cleared for the production of irrigated pastures by wild flooding. About 75 acres in the Forbes field, adjacent to headquarters, is now in irrigated pasture in need of renovation. Another 25 acres of irrigated pasture in the Porter field had been plowed up and planted to oats and vetch for hay production prior to University acquisition of the property. The area has not been returned to irrigated pasture or hay production. The University purchases 45 miners inches of water from the Browns Valley Irrigation District annually. In addition, with purchase of the ranch, the University supposedly acquired water rights to 10-12 inches of water from Porter Creek which runs through Porter field. (It has been subsequently learned that this water in Porter Creek is actually drainage water from the Marty and Selby ranches and escape water from the Browns Valley Ditch).

With acquisition of the ranch it was turned over to the Department of Animal Husbandry to operate until the area was funded as a field station. To provide operating funds the department purchased light weight weaner calves each fall which were carried on the ranch from 8 to 9 months. Revenue from their increased weight gain provided needed operating funds. These calves were subsequently used in experiments on the Davis Campus and Imperial Valley Field Station. Ranch operating funds, from the Animal Husbandry Department Feeding Trial Budget, were turned over to Agricultural Field Stations to administer. In addition three department positions formerly at the San Joaquin Experimental Range were transferred to the new station. These positions were a Specialist, Herdsman and Assistant Herdsman. The former became acting superintendent and the latter two reside in old ranch buildings on the station.

Agricultural Field Stations provided increasing amounts of operating funds each of the three years in addition to a Minor Capital Improvement Budget of $50,000 available for the 1962-63 and 1963-64 fiscal years. The University Dean of Agriculture furnished funds for purchases from the State Educational Agency for Surplus Property and the Soil-Vegetation Survey made by personnel from the Department of Soils and Plant Nutrition and Department of Agronomy. Instruments for a weather station were furnished by the Water Resource Center.

The 48 grade Hereford cows remaining from the breeding herds at the San Joaquin Experimental Range and 11 purebred two-year-old Hereford heifers, from the University herd at Davis, were moved to the station on June 24, 1960. Management of these breeding females and the weaner calves stocked annually has provided information on carrying capacity of the area as well as some of the production problems in year around operation. Lack of stock water development, lack of cross fencing and poor boundary fencing of the ranch prevented good control of the animals as well as desired management procedures.

Because of inadequate facilities and personnel, it was not possible to keep as complete and detailed records as desired."

Joseph P. Guild (the first Station Superintendent)

Please take time to view the displays along the north wall. Included are:

1. " Map showing the drainage basin of the Yuba River together with canals diverting water therefrom" From: Report of Irrigation Investigations in California. Bulletin No. 100. U.S.D.A. Office of Experiment Stations. 1901.

Note that there are no dams on the Yuba at this time. If anyone has stories, pictures, newspaper clippings or whatever about the pre-dams Yuba River, I would be delighted to hear about it.

2. Yuba City section of the map of California. U. S. Department of the Interior, Bureau of Land Management. 1996.

The only commercially available map I know of that shows the SFREC. Note that the Yuba River forms the entire Southern boundary.

3. Enlargement of a section of the Smartville Quad (U. S. Geological Survey) showing the Timbuctoo Bend region of the Yuba River.

Note locations of Parks Bar and Rose's Bar. (Both are "sites", being buried under 60 to 70 ' of gravel) There is a wonderful history of these, and other nearby locations, in "Historic Spots in California", revised by Kyle (see citation 9. below).

4. Remembering the Main – Time runs out on the Yuba aqueduct. Article in the Yuba-Sutter Appeal-Democrat, March 31,1990.

Apart from spring development, the "Upper Main" was the early source of water for the SFREC.

5. Township maps of Yuba County. From: History of Yuba County, California. Thompson & West, Oakland, CA. 1879. (Available in the California Room of the Marysville Library)

See if you can find "Cabbage Patch". Then, tell me what it was. Check out the A. R. Forbes place in Parks Bar Township. And, the A.P. N. Labaadie place up in Foster Bar Township. Tim, was A. B. Clark at Bullard's Bar a relative?

6.Partial map, Marysville Lake Project. From: Environmental Working Paper, Marysville Lake Project (Parks Bar Site), Yuba River, California. U. S. Army Engineer District, Sacramento, CA. July 1976.

If completed, this project would have significantly impacted the Station, forcing loss of valuable pasture land in tland in the Hawarth area, and a new Station entrance road coming in from the north.. But Shucks, I could'a gone fishin' off'a Forbes Hill!

7. Preliminary Station Plan (for the) Sierra Foothill Range Field Station, SFR-1. March 1962.

First official map of the Station. Shows "hold-out Jones and Marty Properties; also, an obscure property along the river. Going from the Headquarters area to Koch & Lewis involved passing through a locked gate on the county road, and a visit to neighbor Carl Selby to borrow the key.

8. Mines and Prospects of Yuba County, California (map). Division of Mines, Department of Natural Resources, State of California.

Anybody know of a hard-rock mine location where, without trespassing, I could find a real chunk of quartz, from the mine, with a fleck of gold in it? I'm serious.

The Basics of Direct Marketing

Roger Ingram, Livestock/Farm Advisor
University of California Cooperative Extension

Find a Niche

The way to successfully direct market your beef is to do something no one else is doing. With conventional beef sales, hamburger can be produce for about sixty cents a pound. If you can figure out how to do it for 59 cents a pound, and remain profitable, you will be very successful. If you can't do this at a size and scale that can be profitable, you have to look at other ways of differentiating yourself from the competition.

A niche can be something that is consistent high quality. It can also be that is non-tangible. Ervin's Natural Beef is located in Arizona. Will and Jan Holder turned to direct marketing of beef when they found they could not survive economically by selling conventionally. Some of their customers purchase their beef because they advertise that they do not kill predators. The beef does not taste any better, but it is a difference their customers are willing to pay for. The difference can be perceived thing. For instance, which is better – Coke or Pepsi? They are essentially the same product – flavored sugar water. If people can find different niches for sugar water, you can probably find some for beef.

The following table is a starting point of some potential beef niches:

Slaughter procedures – Different ethnic and religious groups have specific requirements	Grass-fed Beef
Organic	Corn-fed
Angus	Longhorn
Prime	Lean
Guaranteed tender	From a Family Farm
Locally produced	Humane handling

Selling the Whole Carcass

One issue you will face in marketing is the ability to sell both high and low-end cuts of beef. Conventional beef marketing deals with the problem by using price. Chucks, hamburger, and rounds are cheap. Loin steaks and tenderloin are expensive. An industry saying goes, "you have to sell it before you smell it." This means lowering the price until the beef is sold.

Marketing on a smaller scale gives you more flexibility in selecting customers that want product in the proportions you need to sell. For example, if a restaurant wants 50 pounds of tenderloin a week, you will have to balance that demand with customers willing to buy 1,000 pounds of hamburger a week. If you can't match them up, you will have to sell it on the conventional market for less. In order to avoid this, you will need a lot of hamburger customer as 50% of the carcass will be hamburger.

You will also find that low-end cuts are more price sensitive than high-end cuts. While you may be able to charge double or triple market price for your tenderloin, you may have to settle for 10-20% more for your ground beef.

Another way of dealing with lower demand and lower-priced cuts is to add value to them. The margin on round roast is small, but if you turn it into jerky or ready-to-serve marinated roast, suddenly you have products that rival loin steaks in profitability.

Ervin's Natural Beef has used farmer's markets to sell cuts they could move elsewhere. One example was skit steak. They took the steak, added spices, rolled them up, sliced them, and labeled them spiced pinwheel steaks. They set up a grill, cooked some up, and handed out samples. Recipes and cooking instructions were handed were handed out with each sale. They sold out in an hour – for $4.50 per pound. These were the same skirt steaks they could not sell at $1.50 a pound.

Know How Much Yield per Cut a Carcass will Give You

There are a million ways to cut up a carcass. Do you know the difference between a top sirloin and a T-bone; a Kansas City and a New York strip steak; a breakfast and a cube steak? One good way to learn how a carcass is cut up is to go in and observe while it is being done. A good reference book is the Meat Buyers Guide which includes different cuts of meat with a description and photo. Each cut is listed with the codes buyers use to order meat. The book contains information on cuts from beef, veal, lamb and pork. You can purchase the book from C.H.I.P.S. **(www.chipsbooks.com/meatbuy.htm).**

One suggestion from Ervin's Beef is to start out with a cull cow to give you hamburger and store-quality tenderloin. The next step up is young cows and steers, which give you tenderloin, stew beef, marinated roasts, jerky, and hamburgers. It's imperative that you know your product – how does it taste, what kind of yield, and what cuts works best with different animal classes. You need to understand what kind of production system gives you consistent results.

As a rule of thumb, a 1,000 pound live animal will yield about 350 pounds of saleable beef. This is different from the hanging carcass weight, which has not been trimmed and de-boned. The following is an example of how a carcass can be cut up and how each cut contributes to your bottom line. Your actual weights may vary 5% either way depending on your genetics and slaughter weight, but this generally about average:

Cut	**Lbs / Carcass**	**Price / pound ($)**	**Gross ($)**
Tenderloin	12	9.60	96
New York Strip	14	6.40	89
Ribeye Steak	24	5.33	127
Fajita / Stir Fry	6	3.20	19
Round Roast	67	2.76	184
Ground Beef	170	1.75	297
Totals	293	4.84 (Average price)	812

In this example, the average price per cut received was $4.84. Taken together, ground beef and round roast made up 81% of the total weight sold and contributed 59% of the total value of the carcass. The majority of your carcass will be in lower value cuts.

Make $10 Mistakes, Not $1,000 Ones

Always remember that you will not be able to market like large companies. They are experienced at moving large quantities of beef very cheaply. When first starting out, sell to friends, or to groups. Sell sides of beef using an ad in the local paper. Call up local groups and ask if you can sell beef for them to use at their next big barbeque. You should invite comments and criticism from people and groups to better understand what you need to do to maintain quality and consistency. Once you get a customer, you want to keep them.

When first starting, stay small until you have worked out "bugs" and know you can produce a consistent product. For example, don't mount a huge advertising campaign, don't buy processing, or make any other major moves. Lease or hire it done for the short term at first.

Glenn Nader and Steve Blank have written an excellent report on direct marketing that includes four case studies. You can access the information at:
http://www.sarep.ucdavis.edu/grants/Reports/nader/

Pricing

In order for you to determine a price, you need to understand the breakeven price to get a calf you will sell from birth to the finishing stage. You will need to add processing, storage, transportation, packaging, and distribution costs. Once you know the breakeven, you can figure a profit you need on top that will make this enterprise sustainable. Once this is done, stick by your price and do not let people talk you down. You can't be all things to all people, and there are plenty of places for someone to find cheap beef.

Learn to be Creative

There is an excellent infrastructure in this country for transporting, processing, packaging, and distributing beef. Unfortunately, none of it is geared toward the small producer. It will cost almost as much to ship 100 pounds of beef across town as it does to ship one ton across the country. You will need to plan on customizing every little step, from pasture-to-plate and should not take anything for granted.

Frozen vs Fresh

Ervin's Natural Beef has not experienced any difference in quality between fresh and frozen beef. There can be a discoloration of the beef when you freeze it, but after it's cooked it all looks the same. Despite this, there is a perceived difference. Ervin's has yet to meet a chef who will accept frozen product. Consumers may have the same preference, although the first thing they do when they get home is put it in the freezer if they are not going to cook it right away! There is no set answer here – your market will help define where the most sales can occur.

Scheduling

Direct marketing of beef can range from marketing everything in one day to several times during the year. If you go to farmer's markets, not having product for a couple of weeks may not be a big deal other than some lost sales. Selling to stores and restaurants is different. You have to earn their trust that you will never run out, and if you ever do, you will most likely lose them as a customer forever. The way to avoid this is planning.

Stores and restaurants have a very good idea of how your product will do with their customers. Feel free to ask them what your volume might be, listen, and respect their advice. Ervin's makes it a rule to have a major new client one full year before expanding, so that they can get a good feel for the new client's demand cycle.

There are basically three ways to sell beef: frozen, feedlot, or seasonally. While their can be combinations of all three ways, the way that you schedule delivery of your cattle will depend on how you are selling them.

Frozen is the most forgiving. Frozen storage is your pipeline, although storage does cost money. You can theoretically finish all your beef in three months, throw it all in a freezer, and then sell all year long. You will need to include storage costs in your breakeven analysis, but this can be a way to smooth out bumps between supply and demand on a new customer.

Either running your own feedlot or sub-contracting with an existing feedlot can be another way to go. The feedlot becomes your pipeline. You must develop the ability to buy the right weights at the right time of the year to meet your demand. You will either have to develop multiple breeding seasons or buy from a larger geographical area where people do not all calve at the same time. Since more of your cattle will finish within a year, you can move and make changes faster. A grass-fed program may take longer – especially if it takes you two years to finish an animal.

Seasonally produced is the hardest to implement from a scheduling standpoint. It does have the advantage that your cattle are out on pasture earning money rather than costing money through bought feed or paying rent for frozen storage. You will have to devise a strategy to get your cattle to finish throughout the season. This is complicated by such variables as: differing rates of gain, sickness, drought, demand surges, predator kills, carcass variability, and mechanical breakdowns at the slaughterhouse. Once you get behind, things snowball fast and it's almost impossible to keep up.

Learn How to Cook Your Own Beef

Ervin's found that most people do not know how to cook a variety of dishes and what is the appropriate cut of beef for that dish. There have been times that customers have called and complained about the toughness of the steak. After some questioning, they usually find that something like a round steak, put it under the broiler, and then overcooked it. Grass-fed beef

need cooking instructions that go with as it needs to be cooked more slowly than what people are used to with grain-fed beef.

You will need to have knowledge of how to prepare and cook your beef, what cuts of beef go with what dishes, and recipes. This is another example of value-adding – the value coming from your knowledge and written materials.

There are many other factors to consider when starting a direct marketing enterprise such as situational analysis, types of clients, distributors, selling venues, labeling, packaging, insurance, and many others. The above should be considered a quick overview of some important factors, not a complete guide. Other sources of information are included at the end of this paper.

Do I Want to Market?

Is it realistic for you to produce and direct market a product? This is a fundamental question to ask. You, as an individual, can not handle both jobs simultaneously without creating a lot of stress and frustration – and that is assuming you would enjoy doing the marketing! It is far more sustainable to have someone in charge of production and another person in charge of all the marketing. Assuming that most operations will have a small workforce, there will be times during a year when marketing will need assist production and vis versa. Remember, these are two distinctly different types of jobs and separate people need to head them up if you want the enterprise to last for a long time.

Direct Marketing Examples

The following are some direct marketing examples:

Joel Salatin / Polyface Farms. Joel Salatin is one of the most successful direct marketers of livestock product in the United States. Joel and his family own 5550 acres, of which 100 acres is cleared. The 100 acres generates a profit of **$3000 per acre**. They raise and market pastured poultry, eggs, beef, pork, lamb, rabbits, and some vegetables. Everything is direct marketed to the consumer through: on-farm sales, farmers markets, buyers clubs, and restaurants. They sell their beef before is slaughtered through customer pre-orders. The beef is slaughtered in the fall.

Doc and Connie Hatfield / Oregon Natural Beef. After getting frustrated with low prices, they provided the leadership in forming a cooperative of producers who promised a certain number of cattle at different parts of the year. These cattle are then fed out and slaughtered at Washington Beef, with the owner retaining ownership. At slaughter, the slaughterhouse buys the beef at conventional prices, but keeps it separate. The Hatfields then get on the telephone to start taking orders from their customers for the week. They then buy back as much of their beef as demand will allow from the processing facility for a premium, which goes back to the producer.

Will and Jan Holder / Ervin's Natural Beef. Will and Jan raise cattle on their own ranch. They also have Ervin's Natural Beef, which is a marketing agent who buys cattle. A producer is certified by Ervin's to meet the standards which they advertise to the consumer. They are responsible for the product and retain ownership until the steer is on the rail. If a producer does not want the responsibility of finishing a steer, Will and Jan's ranch will buy them and put them

on grass. When the steer is ready for slaughter, it is sold to Ervin's Natural Beef. Ervin's offer three prices: hamburger (cull cow), stew beef (tough steer) and steak (tender steer). They only buy in quantities that match their demand. They offer both fresh and frozen beef.

Yampa Valley Beef. In Routt County, Colorado, a group of producers joined with nonprofit groups and resort-based businesses to create a cooperative called Yampa Valley Beef in 1998. The producer-owned company was formed to preserve working landscapes in the Yampa River valley through increasing profitability for members by selling beef to Streamboat Springs Ski resorts and other restaurants and other retail outlets. They pay a $100 premium per head over traditional terminal markets for utility cows and bulls, and at least 25% of the cattle processed must have been grazed on lands permanently protected by conservation easements.

More Information

Alexander, Ben, 2000. The New Frontiers of Ranching – Business Diversification and Land Stewardship. Sonoran Insititute. This publication provides case studies on the way different ranches have approached diversification. The Sonoran Institute can be reached at 7650 E. Broadway Blvd, Suite 203, Tucson, AZ 857210, 520-290-0828, www.sonoran.org, sonoran@sonoran.org.

Holder, Will and Jan, 2001. How to Direct Market Your Beef. The information in this article came from this paper. The Holders teach a direct marketing class at their ranch. You can reach them at Ervin's Natural Beef, 126 E 19th Street, Safford, AZ 85546, www.ervins.com, ervins@eaznet.com

Nader, Glen, et al. 1998. Natural Beef: Consumer Acceptability, Market Development, and Economics. UC SAREP 1996-97 Research and Education Report. University of California Cooperative Extension. You can access the report at: http://www.sarep.ucdavis.edu/grants/Reports/nader/

Why Grassfed is Best! by Jo Robinson, offers 107 pages of information and resources on health and environmental benefits of eating grass-fed livestock products. It is available for $7.50 plus $2.50 s&h (single copy rates) from: Columbia Media, 2401 N. Cedar, Tacoma, WA 98406, (206) 463-4156, FAX: (206) 463-4666

Salatin, Joel, 1995. Salad Bar Beef. Polyface, Inc. Joel Salatin is one of the premier direct marketers of livestock products in the United States. This book focuses on direct marketing of beef.

Salatin, Joel, 1998. You Can Farm – The Entrepreneur's Guide. Polyface, Inc. Joel Salatin provides information on getting started and succeeding in farming.

Stockman Grass Farmer newspaper. Published 12 times year. This newspaper provides information on many topics including direct marketing. You can reach them at PO Box 2300, Ridgeland, MS 39158-2300, 601-853-1861, sgfsample@aol.com.

Developing Alternative Markets
Summary

David A. Daley
California State University, Chico

In recent years, limited marketing opportunities for cattle producers has forced them to consider a variety of alternative strategies, generally referred to as "niche marketing". Determining true market value has been particularly difficult for small to mid-size cattle operations that have not been able to merchandise semi-loads of uniform cattle of comparable weight and grade.

Niche markets take a variety of forms, from a full fledged cooperative or alliance, to organic beef production marketed in local farmers markets. On each end of the spectrum, cattle producers are challenged to develop a new set of skills, a commitment to a long term goal, and a focus on delivering a product to a consumer. Although each niche has a particular set of issues to address, there seems to be a rather standard set of potential problems that must be carefully evaluated if the program is to be successful.

In all niche marketing programs one of the greatest limitations is a general lack of understanding of market forces, and a lack of marketing expertise. Cattle producers, by and large, are not marketers. They do a great job of producing cattle, but aren't quite sure how to sell it on the other end. Just by deciding to try a new marketing strategy, that problem has not been eliminated. Larger cooperatives sometimes have the ability to hire those with marketing expertise, but "little guys" generally learn through trial and error. Development of a niche market is a learning experience, and definitely requires a long term commitment.

Larger ventures are often hampered by the very nature of cattle producers. We have a reputation for independence, doing our own thing, and not conforming with our neighbor. Cooperatives require people with similar visions, clear goals, and the ability to compromise for the good of the entire group.

Likewise, small niche marketing programs are frequently under capitalized, and don't have the necessary resources to "do the job right". Also, any programs committed to the actual sale of the retail product have a difficult time meeting a consistent year round supply, which is essential for most retail outlets. Those programs selling at the retail level often find it easy to sell the "middle meats", rib and loin, for a premium, but can't effectively merchandise the remainder of the carcass.

Despite the challenges, there are many success stories that suggest niche marketing can work, and can return greater value to producers. The success of Coleman, Maverick, Oregon Natural Beef and Western Rancher's Beef Cooperative, demonstrate that there is definitely room in this industry for all types of market structures. It takes the creative, committed producers to make it happen.

Natural Beef: Consumer Acceptability, Market Development and Economics

A Cooperative Project Between:
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Natural Beef: Consumer Acceptability, Market Development and Economics

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Natural Beef: Consumer Acceptability, Market Development & Economics

Summary

This project provided insight into the viability of grass-fed beef marketing in California. Consumer surveys and focus groups indicated an interest in products that were not implanted with hormones or given antibiotics. Restaurant purveyors were interested in more links between production ranches and restaurant products, and were concerned about the leanness of ranch products and the ability of producers to deliver the consistent quality required for their businesses. A sample marketing plan was developed to provide strategies for potential product development for Northern California.

Four case studies were developed to provide insight into actual market development through past rancher activities. These case studies underscored the issues that need to be addressed prior to considering a marketing plan. A flow chart was developed to visually illustrate the different marketing outlets and the issues that arise trying to address them. Based on these actual experiences, a review document was developed to highlight the issues that need to be addressed with suggestions on how to approach them in a systematic fashion. A business plan model was developed to provide potential ranchers with a framework to use to think through the business side of producing grass-fed beef. A sample budget was included to help analyze individual operations. Because of the small economy of scale, transportation was the most sensitive item in the expenditures. The major consideration in grass-fed beef is location: the location of the nearest USDA-inspected processing plant, and the location of the target market. Thus, strategically locating the grass-fattening operations near a processing plant and the target market greatly reduces the operational costs. Ranchers also need to define their product's yield of retail cuts, and its quality in both tenderness and flavor under their existing management systems.

Lessons Learned

The four ranches featured in the case studies paid a high price for their experience. We hope this publication will save duplication of these expensive learning curves. One operator spent $12,000 on advertising to learn about marketing. Another found their operation needed $2 million in product liability insurance to sell at a farmers' market. They also found that giving away free beef samples at farmers' markets is highly regulated by county environmental health offices. There is a complex interaction between initial start-up costs and economies of scale. Ranchers must balance concerns about the inability to achieve efficiency with small numbers of animals against the risks of experimenting with large numbers of animals.

As the beef market gets further concentrated, it is more difficult for individual ranchers to compete with large processors' economies of scale. Although consumers indicate they would be interested in paying more for grass-fed beef products, they still refer back to the relatively low-price retail market. There are many hurdles ranchers must address in developing a new marketing direction beyond the live product, including liability insurance, transportation, inventory management, labor laws, county environmental health requirements, packing, and advertising. Ranchers have been traditionally encouraged by the Extension Service to consolidate their calving schedules to improve their ranch efficiency. The grass-fed beef

marketing stream could dramatically change schedules to year-round production, to address the year-round consumer demand. Locating grass-fattening operations near USDA-inspected processing plants could be the key to reducing costs and the increasing the potential for success; that coupled with the location of the targeted market will greatly impact the ability to produce a grass-fed product efficiently at an inexpensive cost.

Ranchers have learned through this project that they need to be more concerned about the actual eating quality of the product. The yellow fat that comes from green grass in forages resulted in one producer receiving 10 to 20 cents per pound less, because consumers are unaware that the yellow fat is Vitamin A or beta carotene storage. Most U.S. consumers have been conditioned to expect beef to have white fat that occurs with grain feeding. The additional time required to fatten grass-fed cattle may result in a tenderness problem. Consumer instructions on how to properly prepare lean beef may need to be an important component of the advertising campaign and the education of consumers. Ranchers need to test the impacts of their production systems on the quality of the product produced. This could be done through one of the three university facilities located in California (UC Davis, and California State University at Chico or Fresno).

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For more information about SAREP email link.

The effects of grazing/feeding periods on performance and carcass traits of calf-fed, short- and long-yearling steers

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Introduction

In most countries, beef is produced entirely on pasture, utilizing available forage resources and the ruminants' ability to convert this inedible material to human food (Nicol, 1987). Even in the US, current production systems rely upon forage (either grazed or harvested) to raise animals to about 1/2 to 2/3 their slaughter weight. Backgrounding is also an attractive alternative for agricultural producers seeking to diversify their operations, since it utilizes surplus forage, consolidates the calf crops from small cow-calf units into larger lots of feeder cattle and distributes seasonal calving into year-round beef production (Bennett and Williams, 1994). On the other hand, forage-based production systems present some disadvantages, including increased initial cost of yearlings (due to increased weight), as well as an increase in the time to slaughter (Bidner et al., 1981; Mandell et al., 1997). Some authors have also reported decreases in the quality grade, dressing percentage (Oltjen et al., 1971; Bidner et al., 1986; Bennett et al., 1995) and lean yield (McCaughey and Cliplef, 1996) of backgrounded cattle, but other reports have shown no difference (Sainz et al., 1995). Therefore, the general objective of this study was to evaluate the feasibility of improving biological efficiency of resource utilization for beef production by increasing the contribution of grazed forage to the overall feed inputs to the system. The specific goal of this experiment was to study the effects of different grazing and feeding periods on the performance and carcass traits of calf-fed, short- and long-yearling steers.

Materials and Methods

Sixty Angus-Hereford steer calves from the University of California Sierra Foothill Research and Extension Center herd were allocated at weaning to three groups (20 steers/group/year) during three consecutive years. Calves were born in the Fall (October-November) and weaned in late Spring (May-June); average initial weight was 238 kg. The three outcome groups were as similar as possible at the outset, with animals stratified by frame size, breed, body condition, and age at weaning. Calf-fed steers were sent to the University of

California-Davis feedlot immediately, short-yearlings remained on irrigated pasture until September, and then sent to the feedlot, and long yearlings remained on irrigated pasture until September, then on native range until May-June of the following year and finally sent to the feedlot. Standard management practices were observed, including vaccination, deworming and implantation, and were approved by the University of California-Davis Campus Animal Use and Care Committee. In the feedlot, all animals were fed a low-concentrate diet for a 19-day period and then switched to a high-energy corn-based finishing ration. At the end of the feeding period (i.e., when the average ultrasound backfat for the group reached 11 to 12 mm), all steers were weighed and then slaughtered at the University of California-Davis Meat Laboratory. Carcasses were chilled for 48 h, ribbed, and two trained carcass evaluators assigned USDA quality and yield grades. Carcass characteristics evaluated were hot carcass weight (HCW); percentage of kidney, pelvic and heart fat (KPH); longissimus muscle area at the 12th-13th rib (REA); backfat depth (BF) at ¾ the lateral length of the longissimus muscle; and marbling score. Dressing percentage, yield grade, quality grade, and percentage of retail cuts were calculated using standard equations (Boggs et al., 1998). Carcass specific gravity was determined by weighing the right side of each carcass in air and under water, and carcass fat percentage was calculated using the equation proposed by Garrett and Hinman (1969). Data were subjected to analysis of variance and covariance using the GLM procedure (Minitab Statistical Software, Release 12. Minitab, Inc., College Station, PA), with treatment group and year as main effects. In further analyses all carcass variables were adjusted for differences in final body weight, backfat and marbling score by analysis of covariance.

Results

Growth performance

Table 2 summarizes the growth performance data for the grazing and feedlot phases. No treatment differences between the short and long yearling groups in summer ADG were found. The long yearling group slowly lost weight (-.038 $kg \cdot d^{-1}$) and backfat (-1.3 $\mu m \cdot d^{-1}$) in the Fall, but had improved gains of weight (.863 $kg \cdot d^{-1}$) and backfat (6.0 $\mu m \cdot d^{-1}$) during Winter and Spring.

Averaged across years, the number of days on feed was 188, 158 and 94 for calves, short yearlings and LY, respectively. However, days on feed for each group were not constant among

years, because animals were not slaughtered at a constant DOF but rather at a constant backfat endpoint. For the whole experiment, time on feed for calves (144 to 225 days) and short yearlings (120 to 210 days) varied much more than for long yearlings (90 to 105 days). This was likely due to the heavier weights and greater fatness of the older cattle upon feedlot entry.

Feedlot ADG was quite different among treatment groups, with a marked trend to increase with longer backgrounding times (Table 2). In contrast to body weight gain, backfat gains in the feedlot were similar among groups. In addition, the coefficient of determination between BF gain and BW gain was very low ($r^2 = 0.5\%$; $P = 0.338$). Feedlot DM intake was lowest for calves (8.10 $kg \cdot d^{-1}$), intermediate for short yearlings (9.86 $kg \cdot d^{-1}$) and highest for long yearlings (11.95 $kg \cdot d^{-1}$). The observed increase in feed intake was strongly associated with an increase in average BW ($r^2 = 73.7$). Feed conversion efficiencies, expressed as the gain:feed (DM basis) ratios, were not different among groups (.155, .157 and .121 for calf-fed, short yearlings and long yearlings, respectively).

Figure 1 shows the body weight gain curves averaged across the three years. In general terms, the overall growing and finishing phase was longest for long yearlings, intermediate for short yearlings and shortest for CF. At the end of the finishing phase long yearlings were consistently heavier than the other two groups. The development of the subcutaneous fat depots is depicted in Figure 2. Regardless of treatment group, it is evident that the increase in the subcutaneous fat depot was mainly associated with the feedlot phase, irrespective of age. Table 2 also shows the gains of backfat relative to body weight gains throughout the pasture and feedlot phases. This ratio is an indicator of the proportion of body weight growth that is deposited as subcutaneous fat. Regardless of treatment this ratio was two to eight times higher during the feedlot phase than during the pasture phase.

Carcass traits

The average body weights (BW) at slaughter were 458, 489 and 537 kg for calves, short yearlings and long yearlings respectively ($P<.001$, Table 3). The same trends were found for hot carcass weight (HCW), although the dressing percentage was lower in long yearlings than in the other groups.

Although some differences were observed, the amount of fat in the carcass was less affected by the treatments than weight. For instance, the amount of kidney, pelvic and heart

(KPH) fat was highest in calves, lowest in short yearlings and intermediate in long yearlings, but these differences were small. No differences were seen in subcutaneous fat between groups (mean 10.6 ± 3.1 mm). This was expected since all three groups were slaughtered at a similar average ultrasound backfat. Longissimus muscle areas were highest in short yearlings, lowest in calves and intermediate in long yearlings. Carcass fat content was highest in the short yearlings, slightly lower in calves, and much lower in long yearlings. Longissimus muscle fat contents followed a similar pattern, except that there was no significant difference between calves and short yearlings. Marbling scores and quality grade, on the other hand, were highest in calves and lowest in long yearlings, with short yearlings being intermediate. There were no significant differences among groups in yield grade and estimated retail product yield.

Implications

Increasing the backgrounding period reduced time on feed and total feed requirements of Angus-Hereford steers. Older cattle reached market finish at heavier weights. Grazing animals gained weight without increasing backfat, which only increased in the feedlot. Prolonged backgrounding may impair animals' ability to deposit intramuscular fat, and reduce quality grade.

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Table 1. Growth performance[1]

		Calf-fed	Short yearlings	Long yearlings	Pooled SD[2]	P[3]
Summer	ADG, kg/d	-	.445	.485	.176	.237
	Backfat gain, µm/d	-	2.0	6.7	12.6	.103
	Backfat:ADG, µm/kg	-	5.8	19.7	40.1	.141
Fall	ADG, kg/d	-	-	-.038	.156	-
	Backfat gain, µm/d	-	-	-1.3	10.3	-
	Backfat:ADG, µm/kg	-	-	-178	780	-
Winter-Spring	ADG, kg/d	-	-	.863	.237	-
	Backfat gain, µm/d	-	-	6.0	7.3	-
	Backfat:ADG, µm/kg	-	-	7.5	10.4	-
Feedlot	ADG, kg/d	1.22[c]	1.44[b]	1.56[a]	.244	<.001
	Backfat gain, µm/d	65.2	62.6	70.9	20.13	.079
	Backfat:ADG, µm/kg	54.0[a]	44.4[b]	46.5[ab]	17.22	.008
	DM intake[4], kg/d	8.10[b]	9.86[ab]	11.95[a]	1.070	.013
	Gain:feed[4]	.155	.157	.121	.0299	.317
	Days on feed	188	158	94	18.5	<.001

[1]All values are least-square means. Average daily gains of weight or backfat determined for each animal as the slopes of the regression of live weight or backfat, respectively, on days of age during the period of interest.
[2]SD, standard deviation.
[3]P, probability of a Type I error.
[4]Feed intake and gain:feed recorded and analyzed on a group basis.
[a, b, c] Means within a row nor sharing a superscript are different (P<.05).

Table 2. Carcass traits[1]

	Calf-fed	Short yearlings	Long yearlings	Pooled SD[2]	P[3]
Body wt, kg	458[c]	489[b]	537[a]	42.7	<.0001
Hot carcass wt, kg	294[c]	315[b]	331[a]	32.7	<.0001
Dressing %	64.2[a]	64.3[a]	61.7[b]	3.10	<.0001
Kidney, pelvic & heart fat, %	2.19[a]	1.96[b]	2.02[ab]	.48	.027
Backfat, mm	10.7	10.7	10.4	3.07	.779
Longissimus muscle area, cm^2	71.0[b]	74.8[a]	72.9[ab]	7.28	.021
Marbling score[4]	11.2[a]	10.9[ab]	9.8[b]	2.83	.016
Longissimus muscle fat, %	4.49[a]	4.78[a]	3.49[b]	1.34	.005
Carcass fat, %	27.7[b]	29.4[a]	23.9[c]	3.90	<.0001
Retail product[5], %	50.0	50.1	49.6	1.21	.067
USDA yield grade	2.94	2.89	3.09	.519	.083
USDA quality grade	Choice$^+$	Choice	Choice$^-$		

[1]All values are least-square means.
[2]SD, standard deviation.
[3]P, probability of a Type I error.
[4]Marbling scores: Slight, 7-9; Small, 10-12; Modest, 13-15.
[5]Retail product estimated According to Boggs et al., 1998.
[a, b, c] Means within a row nor sharing a superscript are different (P<.05).

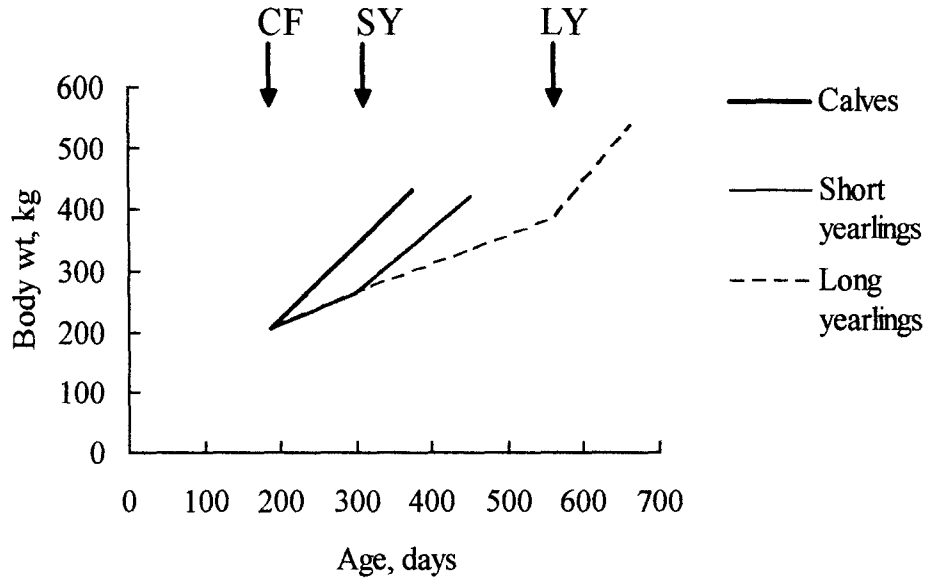

Figure 1. Growth curves throughout the experiment. The arrows show the beginning of the feedlot phase for the calf-fed (CF), short yearlings (SY), and long yearlings (LY).

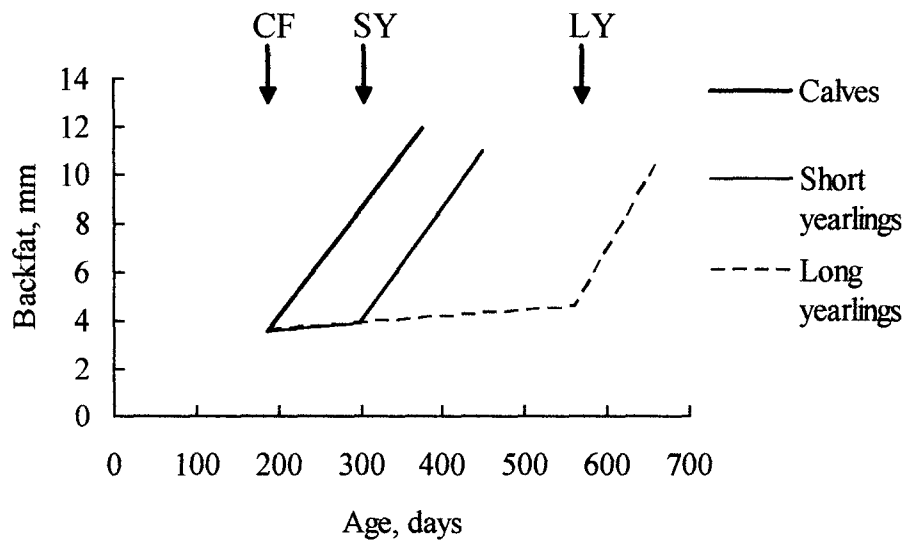

Figure 2. Development of the subcutaneous fat depot measured between the 12th and 13th ribs. The arrows show the beginning of the feedlot phase for the calf-fed (CF), short yearlings (SY), and long yearlings (LY).

UC Sierra Foothill Research & Extension Center
Beef & Range Field Day

April 18, 2002

RANCH BIOSECURITY CONSIDERATIONS

Dr. John Maas
Extension Veterinarian
University of California, Davis
Jason Storm
Veterinary Medical Student
University of California, Davis

CONTROLLING DISEASE WITHIN THE HERD

- Vaccinate the herd against all endemic disease (BVD, Clostridial disease, etc.).
- Decrease stress by using low stress management for movement and processing. Provide ample feed, water, and shade.
- Isolate all sick animals.
- Minimize fence line contact with neighboring animals.
- Do not place cattle of different ages in the same pen.
- Keep records of all disease occurrences.
- Maintain a closed herd, if possible.

PURCHASING REPLACEMENT ANIMALS

- Quarantine all new animals for 30-60 days.
- Test new animals for disease (BVD, Johne's, Salmonella, etc.).
- Purchase animals from healthy and reputable herds.
- Purchase feeds from reputable sources.

ENVIRONMENTAL AND PEST CONTROL

- Provide footbaths at entrances and exits of confinement facilities.
- Provide timely manure and dead animal removal.
- Keep grounds and feed bunks as dry as possible.
- Have an insect control program in practice (insects can be vectors for diseases such as anaplasmosis and bluetongue).
- Have a rodent control program in practice.

DISINFECTION

- Clean and remove as much organic material as possible, before disinfecting.
- Choose a disinfectant that will work against the pathogen you are trying to control.
- Be aware of any toxic, harmful or corrosive effects of the disinfectant.
- Follow the label on the disinfectant package.

VISITORS

- Minimize the number of visitors to the facility.
- Be sure all visitors have clean clothing/coveralls, boots, and hands.
- Minimize visitors' contact with animals.
- Be sure all equipment brought onto the farm is disinfected or that disposable equipment is used.
- Be sure all vehicles brought to the farm are clean and have disinfected tires.
- Do not allow foreign visitors on the farm until they have been in the country for 5 days.
- Do not allow foreign visitors to bring any clothing, foods, or accessories they have had in another country onto the farm.

EMPLOYEES

- Be sure all employees understand and follow the biosecurity protocol.
- Realize that employee owned animals can be a possible source of contamination to your facility

WEBSITES

http://www.kla.org/membership/Biosecurity.htm
http://www.cvm.umn.edu/anhlth_foodsafety/biosecurity.html
http://www.vetsci.sdstate.edu/xnews/BCBPPA.htm

Ranch & Farm Biosecurity

Economics; A good biosecurity program can improve the economics of any operation by:

- Decreasing death losses
- Preventing production inefficiency due to sickness
- Increasing the sales of disease free breeding stock
- Creating more consumer confidence in the product so that consumers know they are purchasing a healthy, quality product, and therefore will purchase more product.

Aspects that must be considered when designing a biosecurity program:

Steps to control disease within the herd:

- Vaccinate your herd against diseases that are common in your area, such as BVD, Clostridial diseases, etc.
- Decrease stress by using low stress management for movement and processing. Provide ample feed, shade, and water.
- Isolate all sick animals in a designated hospital area.
- Keep cows in established groups and limit co-mingling between the groups.
- Prevent contact between resident cowherd and purchased stocker or feeder calves.
- Minimize fence line contact with any neighboring herds.
- Conduct a post mortem exam if an animal dies from an unexplained cause.
- Quickly remove dead animals and burn, bury, or render them.
- Do not show animals and return them to the farm. If you must show animals and return them to the farm, treat them like a newly purchased animal and quarantine them for 30-60 days.
- Keep records of all disease occurrences to identify endemic disease, or diseases transmitted from mother to offspring (BVD, Johne's).
- Consider a test and cull strategy to identify and eliminate chronic carriers of disease within the herd (Salmonella, Johne's, BVD).
- Maintain a closed herd if possible, or attempt to isolate purchased groups of animals.
- When unloading incoming livestock, be sure they are unloaded directly into a quarantine area.

Special Considerations for calves and young cattle:

- Separate cows and heifers when calving to allow the heifers that will be calving to have a higher plain of nutrition and thus better colostrum and a greater chance of preventing disease.
- Calves should be born in uncrowded fields or newly bedded pens with as little manure contamination as possible.
- Calves should receive colostrum within the first 2-4 hours of birth. Do not use colostrum from dairies if possible.
- Cow-calf pairs should be removed from calving fields within 1-2 days of calving.
- After calves are weaned put calves together in groups depending on age (i.e. put younger calves together in one group, and put older calves in a separate group).
- Do not buy dairy or beef calves from other herds to replace dead calves.

Things to consider when purchasing replacement animals/feeds:

- Quarantine all new animals for 30-60 days.
- Purchase replacements from reputable, healthy herds.
- Test new animals for disease (Trichomoniasis, BVD, Johne's, etc.).
- Keep records of all animal purchases and movements to be able to identify where infections are occurring and to notify other producers of diseased animals coming from their facility.
- Maintain closed herd if possible.
- Purchase AI semen and embryos for embryo transfer only from a reputable source.
- Purchase feed from a reputable source (feed can be contaminated by salmonella and fungus).
- Attempt to limit the number and travel of animals (horses, dogs, cats) on the facility.
- Be aware that other species of farm animals (sheep, goats, swine, deer) can be unaffected carriers of diseases that infect cattle.
- Do not borrow, rent, or lease bulls.

Environmental and pest control on the farm:

- Provide timely manure removal.
- Be sure manure and dead animal removal equipment is used only for those purposes, and do not use the removal equipment for feeding unless thoroughly disinfected (see Disinfectant table).
- Minimize the amount of moist and muddy areas on the farm because moisture provides an optimum environment for growth of pathogens.
- Remove any old and/or rotting feeds from the feed bunks and keep the bunks dry.
- Do not step in feed bunk, and do not drive on silage pits.
- Do not feed poultry feed to cattle since it can contain meat and bone meal.
- Provide footbaths at all confinement facility entrances and exits.
- Maintain a clean water supply and do periodic testing to be sure water supply is not contaminated.
- If using recycled water on pasture be aware that a Salmonella problem may be compounded by this practice.
- Have an insect control program in place to prevent insect-borne disease (anaplasmosis, bluetongue).
- Be sure to control any rodent or bird problems with an eradication system because these animals can be the source of Salmonella, rabies, and Leptospirosis.
- Have a pasture rotation system in place to minimize the incidence of parasites.

Preventing the occurrence and recurrence of disease using disinfection:

- Clean and remove as much organic material as possible before disinfecting, because organic material can inactivate disinfectants.
- The use of hot water with high pressure can remove over 90% of the pathogens before disinfection.
- When choosing a disinfectant, choose one that is effective against the specific pathogen(s) you are trying to control (see Disinfectant table).
- Know the correct temperature and pH (acid, basic, or neutral); the disinfectant should be used at.
- Be aware of the contact time required for each disinfectant.
- Be aware of any toxic, harmful, or corrosive effects of the disinfectants used.
- Read the label of any disinfectant used to be sure of the correct dilution, application procedure, and any contraindications to its use on the facility.

Preventing disease spread from human visitors and vehicles to livestock:

- Construct a sign notifying potential visitors to meet you at a designated area off the premises.
- Provide footbaths with appropriate disinfectant for visitors to step in before entering and exiting the facility, (for a footbath to be effective all organic material must be removed from the boot before it is placed in the bath).
- Minimize the number of visitors to the facility, and minimize the animal contact each visitor has.
- Classify visitors into groups depending on the amount of risk they are to the biosecurity of the farm, and regulate their actions depending on these risks (***see Visitor Classification Table***).
- Provide wheel dips or sprays for all vehicles entering your facility. Be sure that all vehicles and trailers are properly cleaned and all organic material from other farms is removed before they are allowed to enter the farm.
- Allow as few vehicles on the farm as possible, and whenever possible, restrict all working vehicles used on the farm from leaving the premises.

Employees' contributions to farm biosecurity:

- Be sure all employees are informed, understand, and comply with the steps you are taking to improve the biosecurity of the farm (this may mean putting up signs and communicating in foreign languages for those employees who don't speak English).
- Make sure that all employees wear clean clothing and footwear when entering the farm each day.
- Be aware that employee owned livestock could be the source of disease spread to your herd.
- Employees must disinfect footwear when going between different units on the farm.

Websites with additional information:
http://www.kla.org/membership/Biosecurity.htm
http://www.vetsci.sdstate.edu/xnews/BCBPPA.htm
http://www.dairybusiness.com/midwest/April2001/biosecurity.htm

DISINFECTANT TABLE

AGENT AND DILUTION	EFFECTIVE AGAINST	INEFFECT-IVE AGAINST	CONTACT TIME NEEDED	COMPA-RATIVE COST PER GAL.	ORGANIC MATERIAL (DIRT, MANURE) INACTIV-ATES	COMMENTS
Bleach dilute (1:10)	Viruses Bacteria Bacterial spores Fungi Mycobacteria	Crypto Giardia	5 min	$1-2	Yes	-Corrosive -Poor residual activity -Works best at higher temperatures
Alcohol ethanol 70-90%	Bacteria Viruses Fungi Mycobacteria	Crypto Giardia Bacterial spores Fungal spores	5-10 min.	$12	Yes	-Corrosive to rubber and plastic. -Evaporates rapidly. -Isopropyl alcohol will not inactivate non-enveloped viruses* -Common antiseptic
Iodine/ Iodophores (Betadine®) 1% dilution	Bacteria Viruses Mycobacteria Fungi	Crypto Giardia Bacterial spores	10 min	$20-50	Yes	- Low efficacy with organic material present -Stains -Hypersensitivity reactions -Not good for hard surfaces -Common antiseptic
Chlorhexidine (Nolvasan®) ~2.5% dilute	Viruses (enveloped¶) Bacteria Fungi	Crypto Giardia Pseudomonas Bacterial spores Non-enveloped virus*	10 min	$30-45	Yes	-Common antiseptic -Not effective against Gram + cocci on hard surfaces -Some residual activity
Hydrogen Peroxide 10-25% for disinfecting	Bacteria Bacterial spores Viruses	Crypto Giardia Mycobacteria Fungi	20 min	$8	Yes	-Corrosive -Antiseptic use at lower dilutions -When used as antiseptic will create heat so don't use on wounds near nerves (Pharynx, Dorsum of penis)

Peroxygen Compound (Virkon®) 1% dilution	Bacteria Viruses Fungi	Crypto Giardia Bacterial spores Fungal spores Mycobacteria	5-10 min	$52 for 10 pounds	No	-Only disinfectant with a label claim for Foot and Mouth Disease virus -Common antiseptic -Active for two weeks after application to a surface
Ammonia (Oocide®)	Crypto Coccidia	Bacteria Virus	30 min	$16-20 (?)	Yes	-Respiratory irritation to animals and humans -Must depopulate area being treated -Spray onto moistened facility
Quaternary Ammonium (Roccal D®) 1:256 dilute	Bacteria Viruses (enveloped¶) Fungi Chlamydia	Crypto Mycobacteria Bacterial spores Pseudomonas Non-enveloped virus*	10 min	$70	No	-Works on hard and porous surfaces. -Works best at pH 9-10 -Often in detergent-disinfectant formulation
Phenols (Tek Trol®) 1:256 dilute	Bacteria Viruses (enveloped¶) Fungi Mycobacteria	Crypto Giardia Bacterial spores Non-enveloped virus*	Fast	$20-35	No	-Good for porous and cracked surface -Malodorous and irritating -Good residual activity
Formaldehyde (Formalin 37%) Combine with alcohol to make an 8% formaldehyde and 92% alcohol formulation.	Bacteria (bacterial spores) Viruses Fungi Mycobacteria Giardia Crypto Insects	None	18 hours for Crypto 5-10 min for others	$80-90	Yes	-Malodorous, irritating, carcinogenic, and possibl deadly if inhaled. -Must used in evacuated premises -Moisten surface before applying -Can also make a 2-3% formaldehyde in water solution -Gas formulations can be used in sealed buildings by heating formaldehyde in pans placed 30 meter: apart (use 5g/cubic meter of building.

It is important to read all labels before applying any disinfectant.

When disinfecting for Salmonella you must clean and acidify prior to use of disinfectant.

¶ Enveloped viruses include: Infectious Bovine Rhinotracheitis (IBR), Pseudocowpox, BVD, Bovine Respiratory Syncitial Virus, Vesicular Stomatitis, Coronavirus, and Bovine Leukemia Virus.

*Non-enveloped viruses include: Bovine Papilloma virus (warts), Bovine Adenovirus (respiratory disease), and Foot and Mouth Disease virus, Rotavirus, Bluetongue.

TABLE OF VISITOR CLASSIFICATION AND PREVENTATIVE MEASURES

VISITOR CLASSIFICATION	DESCRIPTION	PREVENTATIVE MEASURES
Low Risk	Visitors from urban areas with no other livestock interaction (school tours, etc).	-Ask visitors to arrive on farm with clean clothes and footwear, or provide disposable footwear. -Accompany visitors on the tour. -Minimize the amount of contact between the visitors and the animals. -As visitors leave, instruct them to wash hands and boots with detergent.
Moderate Risk	Visitors who travel farm to farm but have no contact with livestock (salesman, mechanics, feed distributor).	-Follow the same measures for low risk visitors. -Provide clean coveralls if any contact with feed, water, soil samples, manure, or farm equipment will occur. -Sampling equipment must be clean before use. -Before leaving the premises, boots should be disinfected and coveralls should be removed and burned or laundered.
High Risk	Visitors who travel farm to farm and have direct contact with animals (veterinarians, inseminators, processing crews, livestock hauler, neighbor).	-Follow the same measures for low and moderate risk individuals. -Visitors should arrive with clean coveralls, boots, and equipment. -Trucks and livestock trailers should be clean before arrival on farm. -All equipment should be sterile (castrators, dehorners, syringes), and disposable syringes, and needles should be used if possible. -Disposable gloves or plastic sleeves should be worn whenever there is direct contact with body fluids, tissues, or excrement (palpation, assisted births, butchering).
Foreign-High Risk	Any visitor from a foreign country, especially those visitors that have had any animal contact.	-Do not allow any foreign visitor on the farm within 5 days of entering the country. -Do not allow clothing, footwear and accessories (watches, cameras) that have been worn in other countries to be worn on the farm Do not allow foodstuffs from other countries onto the farm. -Provide coveralls and boots and require visitor to wash hands and arms before entering -Allow minimal visitor contact with animals. -If visitor must enter the farm within five days of entering the country, provide a respiration mask, disposable latex gloves, all clothing, and footwear for the visitor.

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Strategic Supplementation of Range Beef Cows: Split Feeding by Body Condition and Stocking Rate

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Introduction

This paper describes five years research aimed at identification of optimal strategies for supplementary feeding of beef cows. Such strategies must maximize use of forage, promote high reproductive and lactation performance, and maintain range condition. The objectives of supplementary feeding on range are to supply nutrients which are deficient in the forage and are limiting animal production, and to maximize enterprise profits. The level of supplementary feeding should never exceed the point where the cost of the last unit of supplement equals the economic value of the production response it produces. While we know a great deal about the need for protein, energy, mineral and vitamin supplementation, we have inadequate information regarding the minimum amount and timing of supplementation required to insure economical cow herd performance.

Past studies have not provided sufficient information about critical management variables and their interactions. The complexity of animal responses, superimposed on variation in forage supply and time lags of months between nutritional stress and reproduction preclude simple analyses and predictions. This study attempts to quantify these responses.

Body Condition and Supplemental Feeding

For years, cattle producers have recognized the important relationship between the body condition of their cowherd and reproductive efficiency. Body condition scoring quantifies this relationship by placing a numeric score on the relative degree of fatness or energy reserves that is observed or palpated. Body condition scoring can be used by cow-calf producers to monitor nutrition programs as forage conditions and nutrient needs change. We have used a body scoring system of 1-9 (Table 1). Previous research has found that cows should have good body condition at calving to ensure good reproductive performance. Those in lower condition with a score of 5 or less at weaning may require a higher plane of nutrition relative to their better-conditioned peers.

Separating the cowherd by body condition and feeding each group according to specific requirements is one "strategic" supplementation method that may significantly increase the efficiency of a supplementation program. With this supplementation strategy nutritional needs can be better targeted, thereby allowing the producer the option of using a variety of energy-containing feedstuffs and/or better quality pasture to realize weight gains necessary to improve body condition, while feeding the cows with abundant flesh (body condition greater than 5) with

lower quality forages to maintain condition through calving. In order to ensure cows have a body condition score of greater than 5 at calving, this strategy must be implemented several months prior to calving. Waiting too long to take action to improve body condition is cost prohibitive and, in some cases, impossible. Producers must recognize that calving through rebreeding is the most critical period in the beef cow's production cycle, with energy requirements at their peak. For example, the average cow needs approximately 40 percent more energy and over 60 percent more protein during this period than when dry. Typically, the cow loses approximately 120 to 140 pounds at calving which should be partially regained 60 to 80 days after calving. Furthermore, she has to produce adequate milk, undergo uterine involution and meet her maintenance requirements. On the downside, there are factors cow-calf producers must ponder if considering split-feeding as an alternative supplementation strategy. Split-feeding the cowherd into multiple groups requires additional pasture, fencing, and water that must be conveniently located.

Experimental Procedure

This experiment is aimed at examination of interactions between cow condition, time of year, grazing intensity (stocking rate) and feed supplementation. To this end, three supplementation strategies (none, standard and strategic) are used in conjunction with two stocking rates (moderate and heavy, Table 2). Stocking rates are maintained during the critical green forage availability time of year, late Fall and Winter. Type of supplement fed and specific time of supplementation are shown in Table 3. Cows enter the trial when they have weaned their first calf on June 1 each year. Standard management practices are observed, with open cows culled.

Measurements are aimed at definition of changes occurring in the cattle and on productivity and economic efficiency. As cows are moved from a paddock, residue levels are recorded. Cattle measurements include body weight, condition score, and ultrasound backfat at various times throughout the year (Table 3). Reproduction (post-partum anestrous interval, conception and calving rates, dystocia) and production (weaning weights) are also monitored. All inputs and outputs are recorded to enable valid economic analyses.

Results

Although there has been significant year-to-year variation, in the first 3 years of the study 59% of the cows (Figure 1) in the strategic supplementation group were in adequate condition and received no late summer supplementation (Aug. 16 - Sep. 30). In October all cows were placed on Heavy or Moderate stocking rate treatments. In the strategic group, low body condition resulted in 45% of the cows not supplemented in the late summer and 84% of the summer supplemented cows to be assigned to autumn supplementation (Oct. 1 - Dec. 31). Clearly cows in good condition in late summer tend to remain in good condition, but only 16% of those in poor condition gained condition with protein supplementation during the dry summer feed season. However, nearly all cows needed winter supplementation, only 1.4% of cows in the strategic group were in adequate condition to not be placed in the supplemented group.

Pregnancy rate was not affected by supplement treatment for cows on the moderate stocking rate (Table 4); however, standard supplementation did increase pregnancy rates for the heavy stocked cows to 88.12% compared to 82.55% and 82.96% for the non-supplemented and strategically supplemented animals, respectively.

Calf weights at weaning averaged about 20 lb greater for cows stocked moderately than for those at the heavy stocking rate for both the non-supplemented and strategically supplemented groups. Stocking rate had little effect on standard supplemented cows.

Strategic supplementation decreased calving interval 6 days compared to non-supplemented cows on moderately stocked pastures. Standard supplementation had a greater effect for heavily stocked cows, but had little effect on moderately stocked animals. The apparent interaction of stocking rate and supplementation strategy warrants further attention.

Table 1. Condition scoring system for beef cows.

Score	Appearance	Description
1	Severely emaciated	All ribs and bone structure easily visible, no visible or palpable fat detectable over spinous processes, transverse processes, hip bones or ribs. Tail-head and ribs project quite prominently. Animal has difficulty standing or walking.
2	Emaciated	Tail-head and ribs are less prominent. Individual spinous processes are rather sharp to the touch but some tissue cover exists along the spine. Animal not weak, but no fat detectable.
3	Very thin	Ribs are individually identifiable but not so sharp. No fat on ribs, brisket, spine and over tail-head, with some tissue cover over dorsal portion of ribs. Individual hind quarter muscles easily visible, spinous processes apparent.
4	Thin	Spinous processes can be identified individually. Ribs and pin bones are easily visible and fat is not apparent by palpation on ribs or pin bones. Individual muscles in the hindquarter are apparent.
5	Moderate	Ribs less apparent, less than .5 cm fat. At least 1 cm fat on pin bones. Last two or three ribs felt easily. No brisket fat. Hind quarter individual muscles not apparent. Area on either side of tailhead now has palpable fat cover.
6	Good	Smooth appearance throughout. Some fat deposition in brisket. Individual ribs are not visible. About 1 cm of fat on the pin bones and on the last two to three ribs. Fat evident around tailhead.
7	Very good	Brisket full, tailhead and pin bones have protruding fat deposits. Back square. Indentation over spinal cord. Between 1 and 2 cm fat on last two to three ribs. Some fat around vulva and in crotch.
8	Obese	Very fleshy and over-conditioned. Back very square. Protruding deposits on tailhead and pin bones. Brisket distended. Neck thick. Large spinal cord indentation. 3 to 4 cm fat on last two to three ribs.
9	Very obese	Extremely wasty, patchy and blocky. Tail-head and hips buried in fatty tissue. Bone structure no longer visible and barely palpable. Motility may be impaired.

Table 2. Experimental groups.

Treatment	Description
Supplementation	
None	No supplement given
Standard	Supplement fed during entire dry feed season
Strategic	Supplement given only to meet condition targets
Stocking rate (Nov. 16 - Feb. 28)	
Moderate	ca. .75 cows/acre; >800 lb/acre residue (Oct. 1)
Heavy	ca. 1.0 cows/acre, 625-800 lb/acre residue

Table 3. Supplement Application Design.

Item	Supplement Applied					
	Jun1-Aug15	Aug16-Sep30	Oct1-Nov15	Nov16-Dec31[1]	Jan1-Feb28[1]	Mar1-May31
Supplementation						
NONE	None	None	None[2]	None[2]	None[2]	None
STANDARD	None[3]	Protein[3]	Protein[2]	Alfalfa	Alfalfa	None
STRATEGIC[4]	None	None Protein[3]	None[2]——— Protein[2]———	None[2] Alfalfa	None[2]——— Alfalfa———	None None
Body condition score & weight	Aug 15	Sep 30		Dec 31		May 31

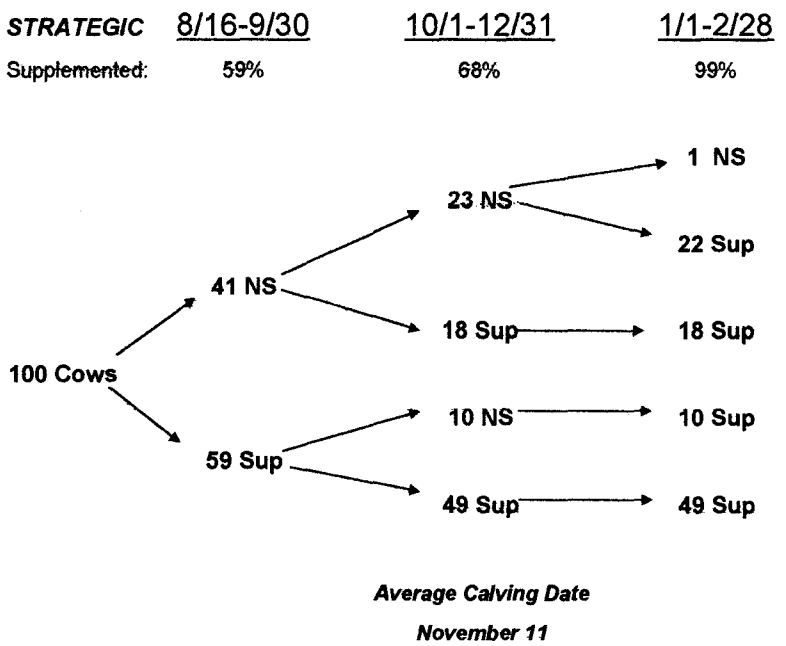
[1]Allocate cows at two forage availabilities, moderate and high.
[2]If forage availability is less than 625 lb/acre, supplement to achieve minimal forage intake.
[3]Cows which have weaned their first calf are grazed on irrigated pasture in the supplemented groups.
[4]Cows allocated to strategic supplementation are assigned their supplement based on a model at each body condition scoring date.

Table 4. Effect of Supplement Treatment and Stocking Rate on Subsequent Pregnancy Rate and Calf Weaning Weight.

Supplement Treatment	Stocking Rate: Heavy	Stocking Rate: Moderate
	Pregnancy Rate, %	
None	.8255[a]	.8835[b]
Standard	.8812[b]	.8759[ab]
Strategic	.8296[ab]	.8756[b]
	Weaning Weight (lb)	
None	473.51[a]	498.06[c]
Standard	487.64[ab]	498.59[bc]
Strategic	479.47[b]	494.01[c]
	Calving Interval (days)	
None	372.80[c]	370.65[bc]
Standard	364.44[ab]	367.22[bc]
Strategic	367.88[abc]	364.56[a]

[abc]Means without a common superscript differ (P<.05).

Figure 1. Schematic of average proportion of cows requiring supplementation (Sup) during experimental periods over three years. Cows not supplemented are designated NS.



Feeding Rice Straw to Cattle

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Feed is the largest single cost of producing beef. Producers with access to alternative feeds often have economic advantages due to the lower cost of these non-traditional feeds. However, these types of feeds often present challenges due to variable consistency, variable supply, potential toxicants and unusual composition. Rice straw, a by-product of the rice grain industry in Northern California, is a potential alternative feed for cow and calf producers. Increasing regulations and restrictions on burning rice straw has stimulated interest in using it for other purposes like cattle feed.

Rice straw has limited forage value (low protein and digestibility), which means that it should be used as a dry matter supplement and **not** a complete ration. Results of feeding rice straw have been mixed in the past, depending on the use and quality. Most of the major problems have occurred when rice straw is the only source of feed.

Challenges to Feeding Rice Straw

Palatability - This can be improved with how soon it is baled after harvest. In addition, rice straw has a slight pubescence or small hairs on it that may take cows time to adjust to.
Digestibility - Rice straw has high silica content of 8 to 14%, as compared to alfalfa hay that has 1 to 2%. The silica is indigestible and decreases the utilization of rice straw.
Low Protein - Crude protein of 2 to 7 percent in rice straw requires protein supplementation to meet cattle's requirements.
High in Oxalates - Oxalates in rice straw decrease the absorption of calcium. This may not present a problem in the Intermountain region of California, where producers supplement with calcium rich alfalfa hay, but should be evaluated in other areas.

Variability in Straw Quality

Rice straw quality can vary tremendously. Data collected in University research has found that crude protein varied from 2 to 7 percent and Acid Detergent Fiber (ADF) from 44 to 56 percent. Crude protein is estimated by determining the total nitrogen, then multiplying by 6.25, which converts nitrogen to protein values. ADF is a laboratory method of determining the fiber content that can assist in predicting the digestibility of a feed. Straw with lower ADF values is more digestible. Energy can be estimated from ADF by calculating Total Digestible Nutrients (TDN). Several methods are available with similar results. One method is shown on page 7. Rice straw of 2 percent protein should not be used for cattle feed, as its forage value is less than the cost of baling.

Research has not been able to thoroughly explain the reasons for variability, but some of the important factors on forage quality seem to be:

Days baled after harvest
Nitrogen fertilization management of the rice
Location of the rice field

Rice producers have considered the straw as waste product and have baled it at their convenience after harvest. The Holzapfel Ranch in Willows has successfully used rice straw as cattle feed for more than 40 years. The key to their success is that they manage it like hay by baling it within 1 to 3 days after rice harvest. This improves the palatability (smell, flavor, color) of the product. Research suggests significant decreases in quality when straw is baled more than 10 days after rice grain harvest.

Research has found that the higher the nitrogen fertilization of the rice, the higher the straw protein. This is **not** intended as a statement that growers should increase nitrogen applications for improved forage quality. It should only be used as a strategy to pick the higher fertility fields for potential livestock forage production and understand that there is a very high correlation between the nitrogen fertilization and protein content.

Research has shown that the location of the rice field where the straw is produced has different forage quality, even when under the same nitrogen fertility and varieties. More research is planned to determine the cause of the variation by location.

Frequently, cattle producers have little or no idea about the quality of the straw that is purchased. Purchases may be arranged by the brokers or truckers transporting the straw, or with rice growers several hundred miles away. Due to the unknown quality and potential variability, it is very important to have rice straw sampled and tested for quality, preferably before purchase and transportation. Testing rice straw will allow feeding the maximum amount of straw and even more important, prevent using rations that result in reduced cattle performance.

Here are some suggested forage value criteria that can be used:

Crude Protein	4.5% or higher
ADF	50% or lower
Moisture	9-15%

Collecting Samples

Samples obtained with a coring tool for sampling alfalfa hay should be adequate. Rice straw is usually in larger bales, which necessitates a different sampling method than with smaller 2 or 3 twine bales. Larger bales should have 4-5 cores taken from the end or face of about 25 percent of the bales. Typical truck and trailer loads would be sampled from 5 different bales, taking 4-5 cores from each bale. Smaller bales should have a single core taken from the center of about 20 different bales for each distinct lot. Samples (all of the cores from a single lot of hay) may be stored in a 1 or 2 quart zip-lock type plastic bag. Each bag should be adequately labeled for later identification from the lab report.

Lab Analysis

Samples may be sent to commercial labs for chemical analysis. Requests for determination of crude protein and acid detergent fiber (ADF) should be made. Additional tests that are less critical are calcium and phosphorus. Some commercial labs have packages for feed analysis that are less expensive than the same tests independently

selected. Usually rice straw will be fed with other feeds, so those should also be tested in a similar manner.

The following are laboratories that can provide a forage evaluation of Crude Protein and ADF:

Atkins Farm Lab - Chico	(530) 343-4947
JL Laboratory - Modesto	(209) 538-8111
Monarch Lab - Chico	(530) 343-5818
A&L Western Ag. Lab - Modesto	(209) 529-4080

The total cost of the Crude Protein and ADF analysis ranged $16 to $28, plus shipping.

Here are some questions to ask the rice producer about the straw

What are the crude protein, ADF, and moisture levels of the rice straw?

How many days after harvest was it baled?	(Quality decreases after 10 days)
What was the nitrogen fertilization level?	(The higher the better, 140 lbs of N/acre minimum)
What percent grain retention is there in the heads?	(More grain will increase the energy value)
Type of harvester?	(Does it chop the straw in shorter pieces)

Is there mold in the straw?
Has the straw been covered or rained on?
What size are the bales?

Tax Credit

There is a $15/ton tax credit for the purchase of California-grown rice straw that can be used against the "net tax" of California state income tax. For more information and certification contact CDFA representative Steve Shaffer at (916) 653-5658 or at <sshaffer@cdfa.ca.gov>.

Backhauls to Reduce Transportation Costs

Some outlying areas from the rice growing region produce and transport alfalfa hay for dairies, and backhauls may help reduce the cost of transporting low-quality rice straw.

How much rice straw can I use?

Quality of rice straw and other feeds, plus the nutrient needs of the cattle, along with environmental conditions, condition of the cattle and expected performance, determines how much rice straw can be used. Several examples represent an overview; specific circumstances vary and should be done on a case-by-case basis.

Figures 1-3 illustrate various nutrient levels using either 25 or 50 percent rice straw with four (4) different quality hays or rice straw with 1 or 2 pounds of supplement. Supplements were

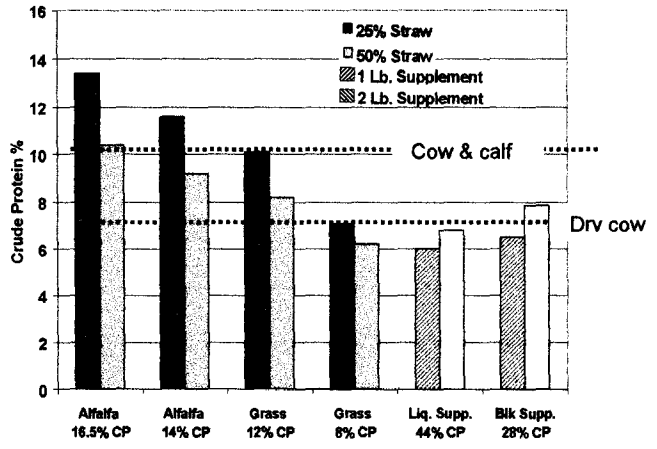


Figure 1. Crude protein levels for 4 different hays combined with either 25 or 50 percent rice straw or rice straw with 1 or 2 lbs. of supplement. Requirement for dry cows or cows and calves are shown for comparison to ration levels.

estimated to increase intake of forage by 20 percent and the efficiency of use of non-protein nitrogen (NPN) was 50 percent of natural protein. Nutrient requirements for non-lactating (dry) cows and cows with calves (early lactation) are shown for comparative purposes.

Protein. Quality of the six examples is shown for crude protein based on a 100 percent dry matter basis. All of the example hays fed with either 25 or 50 percent rice straw except for the lower quality grass hay (8% CP), satisfy crude protein requirements for dry cows. Supplements except at the higher rate for the block supplement did not sufficiently raise crude protein levels to meet requirements. For cows with calves, rice straw should be restricted to 25 percent of the diet with either of the example 12 or 14 percent protein hays. Only when dairy quality alfalfa hay (16.5 percent protein) is used could rice straw account for 50 percent of the ration for cows and calves.

Energy. Quality of the six examples are shown for energy using total digestible nutrients (TDN) based on a 100 dry matter basis. Dry cow energy needs are met by the 25 percent rice straw rations when used with alfalfa and good quality grass hay and supplements. Rations with 50 percent rice straw are lower in energy and would probably result in some weight loss for dry cows. Cows with calves should have no more than 25 percent rice straw plus dairy quality alfalfa hay or at least 2 pounds of the block supplement to meet energy requirements. Rations with lower quality hay may result in weight loss of cows. Milk production on those rations may suffer and re-breeding may be delayed.

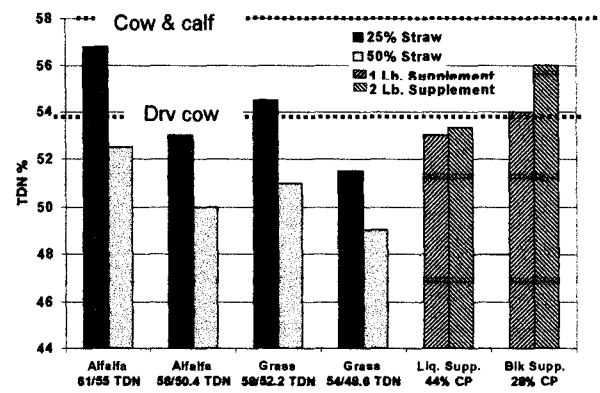


Figure 2. Energy measured by TDN levels for 4 different hays combined with either 25 or 50 percent rice straw or rice straw with 1 or 2 lbs. of supplement. Requirement for dry cows or cows and calves are shown for comparison to ration levels.

Calcium and phosphorus. Calcium levels are generally adequate on all of the example rations (values not shown). Phosphorus is deficient or marginally deficient on most of the rations for cows with calves unless a supplement is provided. Due to storage of phosphorus, a short-term dietary deficiency may not be significantly detrimental. However, phosphorus supplements should be considered, especially when feeding rice straw over extended periods or with heavier milking cows which have higher phosphorus requirements.

Analysis for the supplements:

Liquid Supplement composition: 56.1 % DM, 52.1% TDN, 44% CP (12% natural 32% from NPN), 3.1% Ca, 3.9% P.

Block Supplement composition: 96% DM, 72% TDN, 44% CP (12% natural 32% from NPN), 2.0% Ca, 1.5 % P.

In summary, rice straw generally can comprise about 50 percent of the ration with other hays or all of the ration plus supplement for dry cows. Rations with greater amounts of rice straw may result in loss of body weight. For cows with calves, rice straw generally

should not exceed 25 percent of the ration and medium to high quality alfalfa or high quality grass hay should comprise the remainder of the diet or solely rice straw with at least 2 pounds of supplement. Phosphorus and trace mineral supplements are needed especially for heavier milking cows.

Feeding methods

If crop aftermath, stubble or residual feed is available, cattle may not readily eat rice straw. Feeding rice straw on fields where little alternative forage is present will increase consumption of rice straw. When feeding larger amounts of rice straw, and/or smaller amounts of higher quality hay, dominant cows may get most of the higher quality feeds. This results in some cattle receiving grossly deficient diets. There are several methods to avoid this problem.

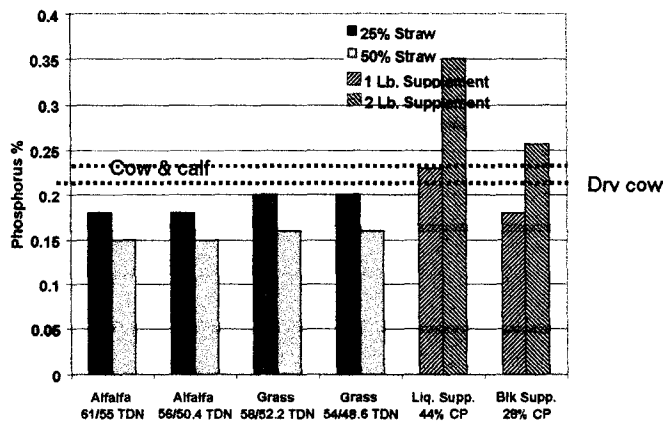


Figure 3. Phosphorus levels for 4 different hays combined with either 25 or 50 percent rice straw or rice straw with 1 or 2 lbs. of supplement. Requirement for dry cows or cows and calves are shown for comparison to ration levels.

Rice straw can be fed by itself every other day, with higher quality hay on the alternate days. Another option is to feed the rice straw first, and the other hay later in the same day. This necessitates two trips, which increases feeding costs. Some producers provide several days supply of rice straw for free-choice consumption. Each day they provide the additional portion of higher quality hay to satisfy nutrient requirements. Spreading the hay/straw over a large area will help to avoid dominance problems. University of Nevada studies have shown that there was no difference in cows that were on poor meadow hay free choice that equals rice straw in quality and given alfalfa every day or every other day. They found that the rumen protein level was stable with the every other day feeding of alfalfa.

Younger cattle are even more of a challenge to get to eat rice straw. Their nutrient requirements are higher, intake capacity less, and they are generally more finicky eaters.

Using Supplements with Rice Straw

Some producers prefer to feed large bales of rice straw free choice on rangeland and provide liquid, tub, or block supplement products. These types of supplements have been shown to increase performance of cattle on low quality forages similar to rice straw. Increased intake and improved digestibility have been noted. The protein portion of these supplements is often partially Non Protein Nitrogen (NPN), which is about 50 percent efficient on these types of rations, compared to natural protein sources. Energy content of the supplement and the complete ration should also be a concern. Soluble sugars in the supplement provide a rapid energy source for rumen bacteria to use to break down the rice straw. The cost of the supplement and the labor requirements will also need to be evaluated.

Formulating Rations with Rice Straw and Supplements

Consider the nutrient requirements of the livestock you will be feeding. Table 1 outlines the daily nutrient requirements of selected livestock.

Table 1 ** Daily Nutrient Requirements of Selected Livestock

	Wt.	Gain	Daily Consumption	TDN	Crude Protein
Dry Cow	1100	0	19.5 (dm)	48.8% (9.5 lbs)	7% (1.37 lbs)
Wet Cow*	1100	0	21.6 (dm)	56.0% (12.1 lbs)	9.4% (2.03 lbs)
Heifer	600	1.0.	14.1 (dm)	59.0% (8.31 lbs)	8.9% (1.25 lbs)

**From Ensminger, 1990

* 3-4 months post-partum, 10 lbs milk/day

Compare crude protein, TDN and ADF of Rice Straw and Protein supplements.

Table 2 Rice Straw Nutritive Values

	CP	TDN (estimated)	ADF
Rice Straw 1	5.1	49.4	48%
Rice Straw 2	2.2	46	52.5%

Table 3 Various Protein Supplements

	CP	CP from NPN	Effective CP	Form	Daily Consumption
Supplement 1	20%	0	20	(Block)	1 lb
Supplement 2	32%	25	19.5	(Liquid)	1 1/2—2 1/2 lbs
Supplement 3	25%	16	17	(Tub)	1-2 lbs

Getting From ADF to TDN**

1. Calculate Digestive Dry Matter

   88.9 - (0.779*ADF) = Digestible Dry Matter (DDM)

2. Calculate Digestible Energy

   -0.027 + (0.0428*DDM) = Digestible Energy

3 $\frac{DE}{4.409} * 100 =$ Estimated TDN

#1 Rice Straw - 48% ADF

88.9 - (0.779*48) = 51.51 = DDM

-0.027 + (0.0428*51.51) = 2.17 = DE

$\frac{2.17}{4.409}$ *100 = 49.4%

#2 Rice Straw - 52.5% ADF

88.9 - (0.779*52.5) = 48.00 = DDM

-0.027 + (0.0428*48.00) = 2.03 = DE

$\frac{2.03}{4.409}$ *100 = 46% = Estimated TDN

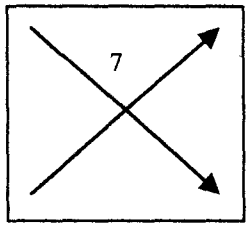
Pearson Square

The Pearson Square is a simple method to check your ration to see if it is meeting the cattle's protein or energy requirements.

1. Place desired value in the center.
2. Put nutrient values of available feed sources in the left hand side.
3. Subtract diagonally across the square and write the result (if it is a negative just enter as a positive).
4. Calculate the percent of the ratio each component will contribute.

Consider our dry cow requiring 7% protein in her diet. Let's use No. 1 Rice Straw and Supplement No. 1 (Block)

Rice Straw 5.1%



13 13/14.9*100=87.2%

Sup. 1 20%

1.9

14.9 1.9/14.9*100=12.8%

Rice Straw 19.5 lbs*87.2% = 17 lbs

Sup.1 19.5 lbs*12.8% = 2.5 lbs

This combination would probably not be the best choice because the amount of supplement required exceeds the manufacturer's recommendation

Rice straw and supplement No.2 (Liquid)

Rice Straw 5.1%		7	12.5	12.5/14.4*100 = 86.8%
Sup. 2	19.5%		1.9	1.9/14.4*100=13.2%
			14.4	

Rice Straw 19.5 lbs * 86.8% = 16.9 lbs
Sup. 2 19.5 lbs * 13.2% = 2.57 lbs

The amount of supplement required is on the upper limits of the manufacturer's recommendation.

Let's look at the cost of this ration:

Rice Straw = $35/ton
Supplement 2 = $250/ton

Rice Straw 16.9 lbs/2000 lbs/ton = 0.00815% of a ton

0.00815 * $35/ton = 29.5 cents/day

Supplement 2.57 lbs/2000 lbs/ton = 0.00158% of a ton

0.00158 * $250/ton = 32.1 cents/day

Total feed cost of 61.8 cents per day or $18.48/month

Key Steps to Make Rice Straw Work in Your Cattle Feeding Operation

1. Make sure it was baled within 10 days after harvest
2. Test the rice straw for Crude Protein and ADF; preferable before your purchase it.
3. Determine what other feeds or supplements will have to be provided to meet the nutritional needs of animals.
4. Compare costs of feeding options or alternatives.

FENCELINE WEANING OF BEEF CALVES

by

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Introduction

In the management of beef cattle herds, calves are usually artificially weaned from their dams at 6-7 months of age. Separation of the dam and young is typically abrupt. Abrupt total separation of dam and young is often accompanied by behavioral indices of psychological distress such as incessant vocalization, pacing along fencelines, and reduction in food intake. These changes in behavior are typically accompanied by a temporary reduction in growth rate. The beef cattle industry would benefit from alternative weaning procedures that reduce the negative effects of abrupt, total separation of cows and calves.

Objective

The purpose of this study was to determine the extent to which fenceline contact between beef cows and their calves at the time of artificial weaning reduces indices of behavioral distress and associated temporary reductions in weight gain.

Procedures

In each of three years (1998, 1999 and 2000), 100 seven-month-old Angus/Hereford-cross calves were randomly assigned to five treatments (20 animals each). The treatment of primary interest was fenceline separation from dams - on pasture (Fence). Other treatments included total separation from dams - on pasture (Away); total separation from dams - drylot - preconditioned to hay (Pre-Con); total separation from dams - drylot - not preconditioned to hay (No-Pre); and non-weaned control animals - on pasture (Control). The two drylot groups were included because some producers place weaned calves in pens for a short period to permit closer scrutiny for health problems and to prevent them from going through fences in attempts to rejoin their mothers. The 20 calves assigned to each treatment in each year were divided into two groups of 10 individuals housed in separate pastures or pens.

Starting on the day of weaning in each year, 10 calves in each of the five treatments were intermittently observed over a 5-day period for vocalizations, feeding (grazing or eating hay), walking (pacing along fence) and lying down (a "comfort" behavior). In addition, fenceline calves and cows were monitored for time spent within 10 feet of the fence separating them and control calves were observed for time spent within 10 feet of their dams. Large numbers were glued to the shoulders of each animal to permit rapid identification of individuals.

Calves were weighed on the day of weaning and every 7 days for 10 weeks. Body weight data collected in 1999 were discarded because more than 85% of the calves contracted infectious keratoconjunctivitis (pinkeye) in at least one eye during the first 9 weeks post-weaning.

The treatments previously described were applied for only the first week after weaning. From day 7 to day 28 post-weaning, calves (from all treatments) were maintained in two groups of 50 animals each on pasture. Thereafter, they were maintained as a single group to day 70. Control calves were weaned (total separation) at eight weeks (56 days).

Summary of Research Results

Behavior. The behavioral data suggests that the psychological distress resulting from abrupt, total separation at weaning is particularly acute for the first three to four days. In most cases, "normal" calf behavior had resumed by the fifth day post-weaning.

For the first two days after weaning, calves in the fenceline treatment spent approximately 60% of their time within 10 feet of the fence separating them from their dams while their mothers averaged 40% of their time within 10 feet of the fence (Figure 1). By comparison, unweaned control calves

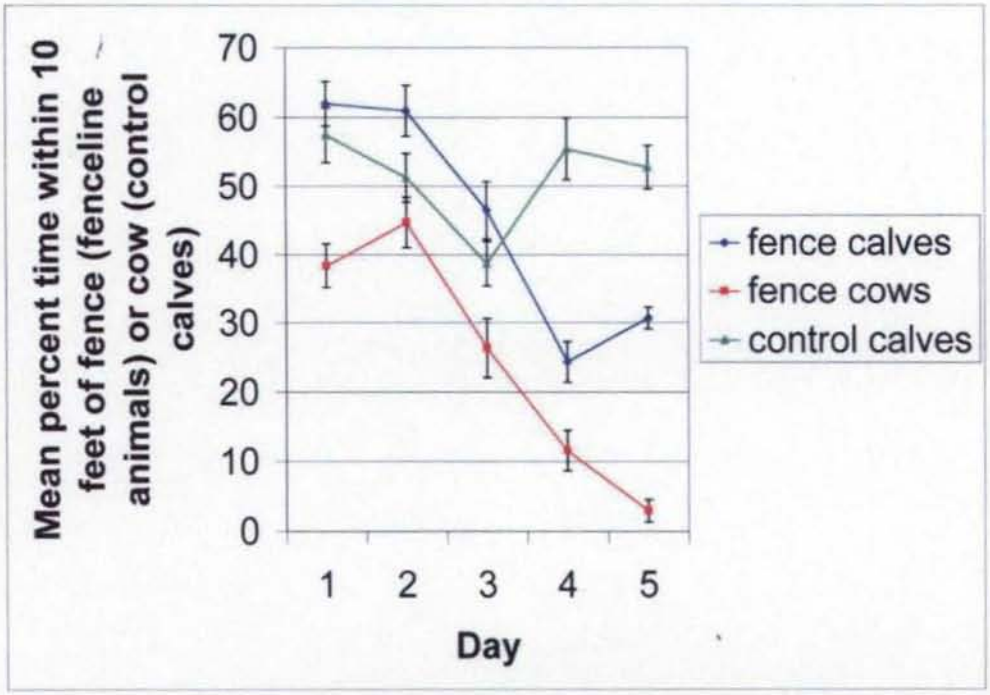


Figure 1. Average percentage of time calves and cows in the fenceline treatment were within 10 feet of the fenceline and percentage of time calves in the unweaned control treatment were within 10 feet of their dams (years combined).

were within 10 feet of their dams about 55% of the time observed. Cows and calves in the fenceline treatment tended to graze away from the fence in groups and then return to the fenceline to stand or lie down, often with cow-calf pairs adjacent to one another (Figure 2).

Figure 2. Typical scene of calves and cows in the fenceline treatment on the day following weaning.

Fenceline calves did not differ from unweaned control calves in time spent feeding in the days following weaning (Figure 3). Calves in the totally-separated treatments fed less. Totally-separated calves on pasture spent more time walking (often pacing the perimeter of their pasture) and less time feeding than calves in the other four treatments during the first three days (Figure 3). Totally separated calves (all three treatments) spent less time lying down and vocalized at more than twice the rate of the fenceline calves during the period of observation (Figure 4). In general, fenceline calves were intermediate between unweaned control calves and totally separated calves with respect to the behavioral indices of distress exhibited. Maintaining calves under drylot conditions and preconditioning them to hay only had minor effects on behavior.

Body Weight. Iin the first 2 weeks post-weaning, fenceline calves gained 95% more weight than calves in the three totally-separated treatments (47 vs. 24 lbs; Figure 5). After 10 weeks, fenceline calves had still gained 31% more weight (110 vs. 84 lbs; Figure 6). Post-weaning weight gains of the three totally-separated treatments did not differ at either 2 weeks or 10 weeks. Fenceline calves were 23% lighter than the non-weaned control calves at 10 weeks (110 vs. 143 lbs.; Figure 6). Of course, the control calves had access to their mothers' milk. Preconditioning drylot-weaned calves to hay had little effect on their subsequent weight gain. It appeared that treatment differences in weight gain were established during the first two weeks following weaning and were relatively persistent throughout the 10-week period of monitoring growth.

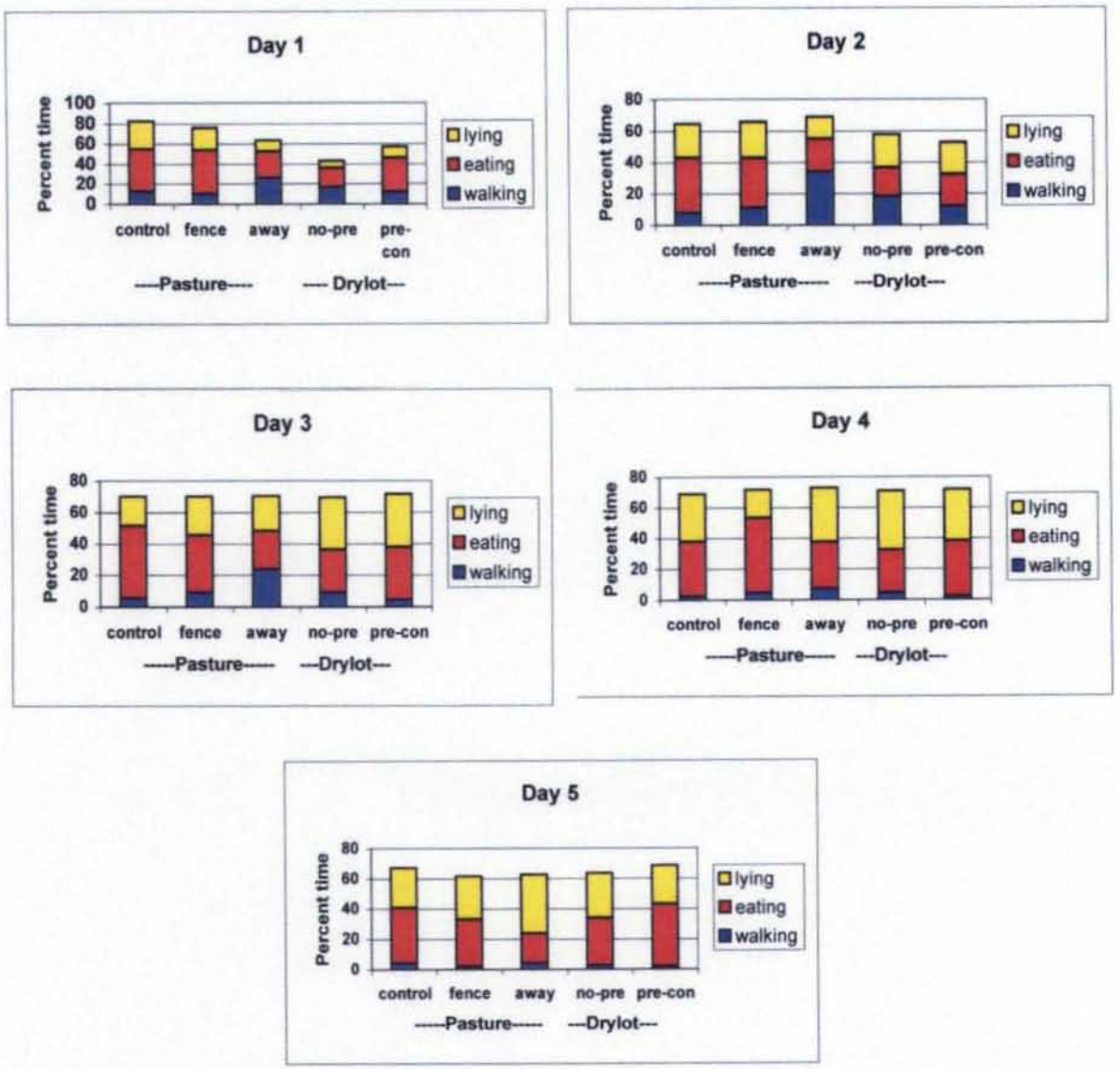


Figure 3. Average percentage of time calves in the five treatments were observed lying down, eating/grazing or walking for the first five days following weaning (years combined).

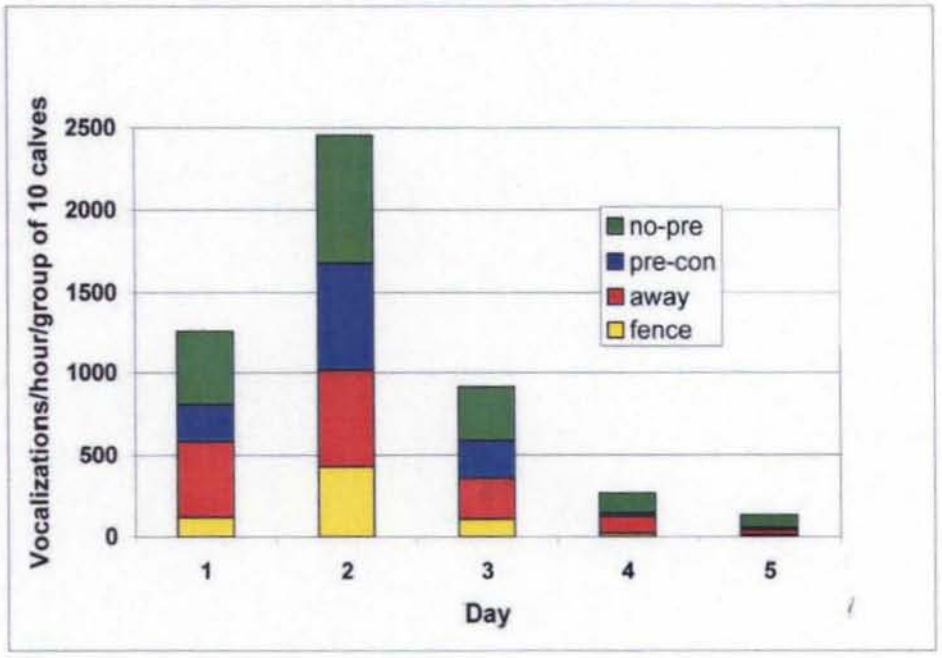


Figure 4. Average total number of vocalizations per hour per group of 10 calves in the four weaned treatments over the five days following weaning (years combined). Control calves did not vocalize.

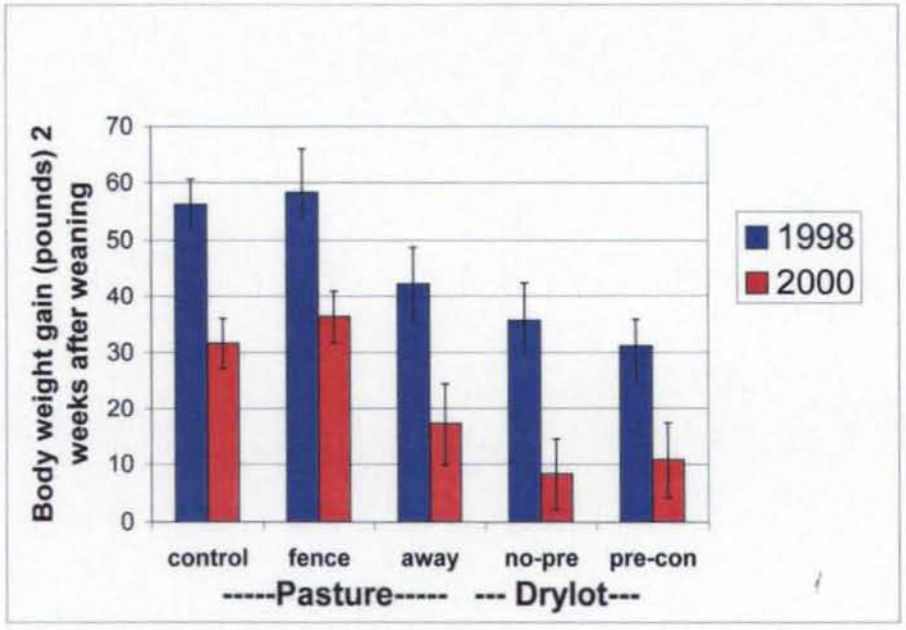


Figure 5. Average weight gain (lbs.) of the calves in the five treatments at two weeks post-weaning.

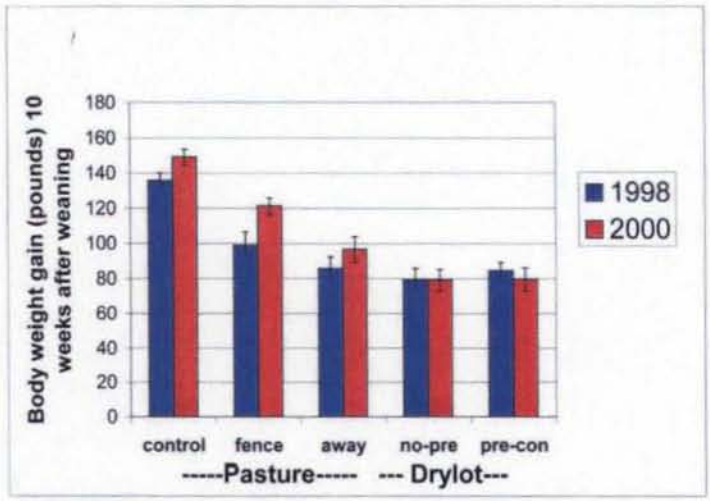


Figure 6. Average weight gain (lbs.) of the calves in the five treatments after 10 weeks.

Fences. Most of the fences used to separate cows and calves in the fenceline treatment consisted of five strands of barbed wire covered with woven-wire mesh. In the three years of the study, we did not see any calf or cow make a concerted effort to push through or go over the fence. Electrified wire can be effective either attached to the fence or as an outrigger 12 to 15 inches out from the fence on the calf side.

Conclusions

It was concluded that providing fenceline contact between beef calves and their dams at weaning reduces the negative effects of artificial weaning on calf behavior and growth rate. Although the effects of weaning on calf behavior were relatively short-lived, treatment differences in weight gain established in the days following weaning persisted for at least 10 weeks. Type of housing of totally-separated calves (pasture or drylot) immediately following weaning and preconditioning calves to hay immediately prior to weaning had only minor effects on their behavioral responses to separation and subsequent weight gain.

Acknowledgements

The author would like to especially acknowledge the assistance of Jennipher Harris, who collected the 1998 data for her M.S. thesis, Reid Borgwardt and Matthew Sween, Staff Research Associates in the Department of Animal Science, and Mike Connor, Superintendent of the UC Sierra Foothill Research and Extension Center where this study was conducted. The staff at the Research and Extension Center are acknowledged for their role in animal care and handling. Eighteen students volunteered their time for data collection. Jennifer Reich formatted this report.

The "Old Headquarters" (site), Haworth Field Dec., 1968.

Timbuctoo Bend on the Yuba River. Aug., 1982.

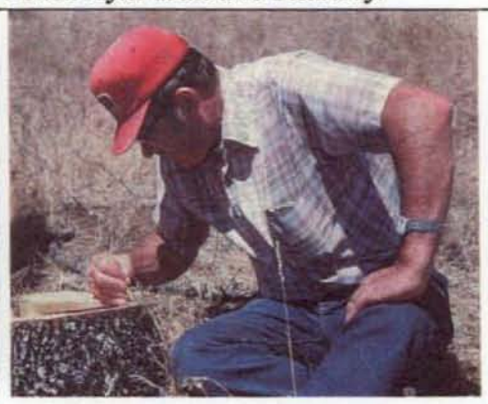
Charlie Raguse on Porter Hill, May 1973.

Burgess L. (Bud) Kay. Mar.,1969.

Director of Agricultural Field Stations Lowell Myler at the 1973 Field Day.

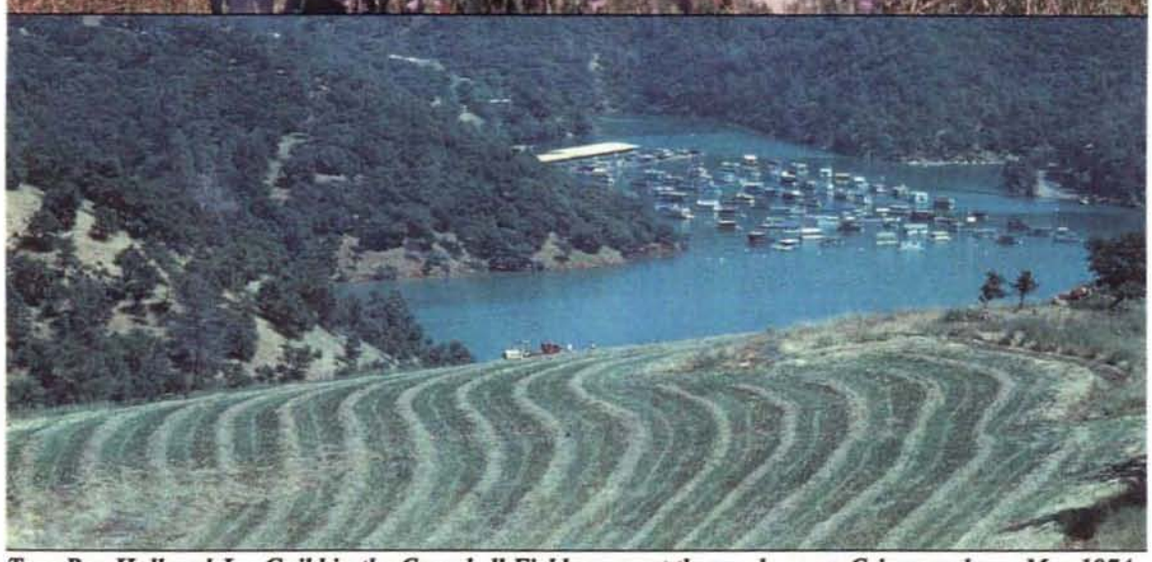
April Clark with Dad. May 1971..

Ken Taggard and Pete Sands preparing to establish plots on Forbes Hill. Nov. 1982.



J.L. (Roy) Hull counting tree rings on a recently-harvested blue oak. Jul., 1978.

Dave Towle, Surveyor, on the Campbell. Jun.,1979.



Top: Roy Hull and Joe Guild in the Campbell Field amongst the newly-sown Crimson clover.May 1974.
Center: Mr. A. R.(Red) Farrell and friend (April Clark) amongst the Brodeia..May 1971.
Bottom: Haymaking on the Campbell amongst views of the Engelbright Reservoir. June 1983.