

People and Agriculture - Can They Coexist? ...John Holt

Water Issues for Beef Cattle Producers ...Roy Carriker

Planning, Property Rights and Value Issues for Florida Landowners ...Rodney Clouser

Environmental Concerns for Agriculture ...Billy Kempfer

Environmental Issues of Concern to Florida Cattlemen ...Carlton Layne

Cattle in the Environment ...Alto Adams, Jr.

Animal Rights - An Issue for the Future ...Farol Tomson

Beef Health Management Prospects for the Nineties ...Owen Rae

Challenges and Opportunities in the Nineties ...Bill Mies

Foreign Beef Trade - Issues and Outlook ...Tom Cook

Sales Contracts for Calves ...Jackie Bass

Contracts and Marketing of Calves ...Harvey Benschoter

Sales Contracts for Calves ...Dan Sumner

The Effect of Backgrounding System and Cattle Type on Net Return ...Tom Spreen

Florida State Fair Youth Steer Futurity ...Don Wakeman

New Products - Successes and Failures ...Jim Lamkey

Impact of Beef Promotion ...John Francis

Ultrasound and Carcass Evaluation Program ...Roger West

Relationship of Muscling to Production Traits ...Don Hargrove

Keeping Beef Records on the Computer ...Bob Sand

Forage Challenges and Opportunities in the Nineties ...Carol Chambliss

Grazing Management of Improved Pastures ...Lynn Sollenberger

Round Bale Silage - A Forage Harvesting Alternative ...Doug Bates

Cultural and Fertilizer Practices for Bahiagrass Seed Production ...Martin Adjei

Experiences with Seed Production from Florida Forages ...Kelsey Payne

Aeschynomene Feed, Seed & Nitrogen ...Wesley Williamson

CATTLE IN THE ENVIRONMENT

ALTO ADAMS, JR.
ADAM RANCH
FT. PIERCE, FLORIDA

FLORIDA'S RANCHES PROVIDE AN IDEAL ENVIRONMENT FOR WILDLIFE AS WELL AS LIVESTOCK. CATTLEMEN WHO HAVE GROWN UP ON THE LAND HAVE LEARNED TO KEEP HAMMOCKS AND TIMBER AS PROTECTION FOR THEIR CATTLE, AND THEY REALIZE THAT BIRDS, GAME AND PREDATORS COMPLEMENT THE CATTLE RATHER THAN COMPETE. WHILE THERE HAVE BEEN MANAGERS BROUGHT IN THAT CLEAR ALL COVER, THESE PEOPLE GENERALLY DO NOT STAY IN BUSINESS VERY LONG BECAUSE THEY DO NOT UNDERSTAND THE WAY THAT FLORIDA'S CLIMATE AND INSECTS AFFECT THEIR CATTLE.

YOU CANNOT CHANGE FLORIDA'S ENVIRONMENT. IT IS HOT AND HUMID WITH LOTS OF INSECTS. THE GRASS IS PLENTIFUL AND THE SUPPLY IS DEPENDABLE. HOWEVER, IT IS HIGH IN MOISTURE AND FIBRE AND RELATIVELY LOW IN TOTAL DIGESTIBLE NUTRIENTS. BECAUSE OF THIS YOU MUST ADAPT THE CATTLE TO FLORIDA RATHER THAN TRY TO CHANGE FLORIDA TO FIT BRITISH OR EUROPEAN CATTLE.

TO HAVE A SUCCESSFUL RANCH PROGRAM YOU MUST HAVE THE TOTAL PICTURE IN MIND. THE LAND, WATER, TREES, GRASS, CATTLE AND THE WILDLIFE ALL HAVE A PLACE. THE CATTLE PAY THE BILLS, KEEP DOWN THE UNDERBRUSH, PROTECT AGAINST FIRE, AND ARE THE REASON TO BE IN BUSINESS. THEY RESTORE ORGANIC MATERIAL TO THE SOIL AND ARE THE PRINCIPAL SOURCE OF PROTEIN FOR THE AMERICAN PUBLIC. GRASS HOLDS THE SOIL, FEEDS THE CATTLE, AND IN TURN IS FED BY CLOVER AND LEGUMES. BIRDS CONTROL ARMY WORMS, GRASSHOPPERS AND INSECTS THAT INFECT THE PASTURES, PREDATORS PICKUP RATS, RABBITS AND SNAKES. WITHIN FLORIDA'S ECOSYSTEM THERE IS A NATURAL CONTROL FOR ALL OF OUR MAJOR PROBLEMS. ONLY AS WE GET INTO ABNORMAL CONCENTRATIONS OF CATTLE SUCH AS DAIRIES OR FEEDLOTS DO WE INCUR ENVIRONMENTAL PROBLEMS.

THE CATTLE PROGRAM THAT WE HAVE CONTINUOUSLY USED IN FLORIDA FOR OVER 40 YEARS HAS BEEN THE DEVELOPMENT OF THE BRAFORD BREED. THIS HAS BEEN DONE WITH THREE THINGS IN MIND. FIRST TO DEVELOP CATTLE THAT ARE ADAPTED TO FLORIDA'S GRASS, CLIMATE AND INSECTS. SECOND TO SELECT BULLS AND FEMALES THAT ARE HIGH PRODUCING CATTLE. THIRD TO RECOGNIZE AND USE NATURAL SELECTION. NATURAL SELECTION INSURES THAT CATTLE REMAIN SOUND, AND ARE ABLE TO BREED NATURALLY AND CALVE WITHOUT ASSISTANCE. OUR CATTLE REQUIRE LITTLE INDIVIDUAL ATTENTION JUST AS DEER OR WILDLIFE ARE PERFECTLY SUITED TO PRODUCING AND REPRODUCING WITHOUT MUCH HUMAN ATTENTION.

FLORIDA'S WATER WAS NEVER MEANT TO BE PERFECTLY CLEAR AND PRACTICALLY STERILE LIKE LAKES IN CANADA OR THE ADIRONDACKS. FLORIDA'S WATERS ARE MORE LIKE AFRICAN LAKES AND STREAMS IN THAT THERE IS AN ABUNDANCE OF SUNLIGHT, HEAT AND LIFE IN THE FLORIDA WATER. IT IS A NATURAL OCCURRENCE AND IS THE REASON THAT WE HAVE SO MANY FISH, BIRDS, INSECTS AND LIFE OF ALL KINDS IN FLORIDA. IF WE TRY TO CHANGE THIS, FLORIDA WILL BE A CLEAN BUT STERILE LANDSCAPE.

AS WE PROCEED WITH TOTAL STATE REGULATIONS OF OUR LAND, AIR, AND WATER, WE WILL FIND THAT STATE SOCIALISM WILL NOT WORK ANY BETTER IN FLORIDA THAN IT

HAS IN RUSSIA. FOR US TO BE SUCCESSFUL WE MUST KEEP OUR LAND IN PRIVATE HANDS AND EDUCATE THE CATTLEMAN TO THE ADVANTAGES OF WILDLIFE AND A TOTAL MANAGEMENT PROGRAM. THERE HAS NEVER BEEN ANYONE MORE CONCERNED WITH LAND PROTECTION THAN THE OWNER WHO LIVES ON HIS LAND.

CULTURAL AND FERTILIZER PRACTICES FOR BAHAGRASS SEED PRODUCTION

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INTRODUCTION

It was estimated in 1985 (Ruelke) that bahiagrass occupied over 70% of the 3.4 million acres sown to improved permanent pastures in Florida. In order to increase revenue, many ranchers have been harvesting seed from the same bahiagrass pastures used in their cattle operation. However, seed yields of bahiagrass are seriously reduced the third year after establishment because of dense sod development. This condition leads to economic losses to both seed growers in Florida and other semi tropical regions of the world. The purpose of this research was to determine the effect of various cultural and fertilization treatments in spring on seed production and quality of bahiagrass.

EXPERIMENT PROCEDURE

In April of 1985 and June of 1986, plots of Pensacola and Argentine bahiagrass pastures that were over 7 years old, at C. M. Payne and Sons Ranch near Sebring, FL, were subjected to four pre-treatments -- chopping (roller chopper), burning, spraying of gibberellic acid (GA) and a control of closely grazed sward. Superimposed on each pre-treatment were 13 fertilizer treatments. These consisted of factorial combinations of 0, 67 and 134 lb/A nitrogen (N); 0 and 150 lb/A phosphate (P₂O₅) and 0 and 80 lb/A potash (K₂O) and an additional fertilizer treatment to satisfy soil test recommendations (67-115-75 lb/A N-P₂O₅-K₂O). Seed heads were hand clipped in July for Pensacola, and in August for Argentine. After drying, seed was cleaned and weighed. Samples of seed were sent to Florida Department of Agriculture and Consumer Services in Tallahassee for germination analysis.

RESULTS AND DISCUSSION

Pensacola

The two year data on Pensacola seed production is summarized in Table 1. The key to improved Pensacola bahiagrass seed production was burning plus nitrogen application. The results indicate that the 2 year average seed production without fertilizer ranged between 72 and 83 lb/A depending on pre-treatment. Pensacola seed yield did not show any positive response to fertilizer application unless the sward was burned. Pensacola seed yield increased to 110 and 140 lb/A when plots were burned and fertilized with 67 and

134 lb/A N, respectively. It was observed from seed head count analysis that burning not only stimulated seed head production, but also induced uniform development to reduce shattering losses. This enabled a more efficient utilization of applied nitrogen towards seed production on burned plots. Seed yield of pensacola also showed some positive response to phosphate application on burned plots, but was not affected by potassium addition. Soil at the experimental site contained on the average 40 lbs P₂O₅ and 140 lb K₂O/A which might explain the lack of response to potassium application. Germination of Pensacola seed produced was 49, 38, 45 and 49% for chopped, burned, GA and control plots, respectively. Total viable seed averaged 80%, regardless of pre-treatment and 31 to 42% of Pensacola seed was dormant.

Table 1. Two year summary of Pensacola bahiagrass seed production under cultural and fertilizer treatments.

| No. | Fertilizer | | Pretreatment | | |
|-------------|---------------------------------------------------|------|--------------|-----|-----|
| | N-P ₂ O ₅ -K ₂ O | Chop | Urn | GA | |
| Control | | | | | |
| 1 | 0-0-0 | 72 | 80 | 79 | 83 |
| 2 | 67-0-0 | 63 | 108 | 81 | |
| 100 | | | | | |
| 3 | 134-0-0 | 54 | 137 | 79 | |
| 113 | | | | | |
| 4 | 0-150-0 | 52 | 128 | 67 | 77 |
| 5 | 67-150-0 | 85 | 107 | 61 | |
| 62 | | | | | |
| 6 | 134-150-0 | 64 | 133 | 74 | 90 |
| 7 | 0-0-80 | 55 | 70 | 42 | 73 |
| 8 | 67-0-80 | 63 | 145 | 71 | 90 |
| 9 | 134-0-80 | 102 | 134 | 67 | |
| 57 | | | | | |
| 10 | 0-150-80 | 58 | 108 | 65 | |
| 55 | | | | | |
| 11 | 67-150-80 | 76 | 130 | 83 | 107 |
| 12 | 134-150-80 | 75 | 138 | 103 | 105 |
| 13 | 67-115-75 | 58 | 121 | 58 | 120 |
| (soil test) | | | | | |
| Mean | | 67 | 118 | 71 | |
| 87 | | | | | |

Argentine

Nitrogen and phosphate fertilizer applications were the most important factors that influenced Argentine seed production (Table 2). Seed produced without fertilization was always less than 20 lb/A. The application of either 67 lb/A N or 150 lb/A P₂O₅, separately, increased seed yield to 136 and 109 lb/A, respectively. Seed yield was not affected by potassium fertilizer probably because of an existing high potassium soil status (140 lb/A K₂O). A linear increase from 10 to 250 lb/A clean seed was obtained when N application rate was raised from 0 to 134 lb/A without addition of

phosphorus or potassium. Mean seed yield from 67 lb/A N and 150 lb/A P₂O₅ applied together was 270 lb/A compared with 290 lb/A obtained with a combination of 134 lb/A N and 150 lb/A P₂O₅. The highest N rate when applied together with phosphorus promoted excessive vegetative growth and induced seed head lodging. Unlike Pensacola, the effect of burning on Argentine seed yield was not consistent from year to year. More seed was obtained from burned plots than the other pre-treatments only in the initial year (1985). Yield from all four pre-treatments were similar in 1986. The two year Argentine seed production averaged over fertilizer treatments were 185, 217, 154 and 204 for chopped, burned, GA and control pre-treatments, respectively. Argentine seed germination ranged between 85 and 90%.

Table 2. Two year summary of Argentine bahi agrass seed production under cultural and fertilizer treatments.

| No. | Fertilizer | | Pretreatment | | | | Mean |
|------|---------------------------------------------------|--|-----------------------|------|-----|---------|------|
| | N-P ₂ O ₅ -K ₂ O | | Chop | Burn | GA | Control | |
| | | | -----yield, lb/A----- | | | | |
| 1 | 0-0-0 | | 13 | 17 | 11 | 4 | 11 |
| 2 | 67-0-0 | | 105 | 154 | 161 | 123 | 136 |
| 3 | 134-0-0 | | 185 | 322 | 203 | 276 | 247 |
| 4 | 0-150-0 | | 62 | 125 | 122 | 128 | 109 |
| 5 | 67-150-80 | | 333 | 251 | 255 | 296 | 284 |
| 6 | 134-150-0 | | 273 | 285 | 302 | 340 | 300 |
| 7 | 0-0-0 | | 19 | 63 | 10 | 8 | 25 |
| 8 | 67-0-80 | | 166 | 162 | 140 | 192 | 165 |
| 9 | 134-0-80 | | 322 | 307 | 193 | 326 | 287 |
| 10 | 0-150-80 | | 105 | 163 | 66 | 104 | 110 |
| 11 | 67-150-80 | | 250 | 330 | 195 | 314 | 257 |
| 12 | 134-150-80 | | 305 | 333 | 179 | 269 | 272 |
| 13 | 67-115-75 | | 273 | 309 | 164 | 278 | 256 |
| | (soil test) | | | | | | |
| Mean | | | 185 | 217 | 154 | 204 | |

SUMMARY

The purpose of this study was to obtain preliminary information on factors that might influence seed yield of Pensacola and Argentine bahiagrass pastures. In two separate trials, attempts were made at improving seed production by imposing four pre-treatments -- chopping (roller chopper), burning, spraying gibberellic acid (GA) and a control (grazed) - on 7 to 8 year old swards of

Argentine and Pensacola bahiagrasses. Superimposed on each pre-treatment were 13 fertilizer treatments consisting of factorial combinations of 0, 67 and 134 lb/A N; 0 and 150 lb/A P₂O₅ and 80 lb/A K₂O and an additional fertilizer rate to satisfy soil test recommendations (applied 67-115-75 lb/A N-P₂O₅-K₂O). The results on seed yield indicate that Pensacola and Argentine bahiagrass responded differently to the treatments imposed. Two year average Pensacola clean seed yield obtained without fertilizer application was 80 lb/A. However, the response of Pensacola bahiagrass in seed production to applied nitrogen was much greater on burned plots. Pensacola clean seed yield of 110 to 135 lb/A was obtained with 67 to 134 lb N/A on burned sward.

Argentine bahiagrass clean seed yields without any fertilizer application was generally low (4 to 17 lb/A) regardless of pretreatment. Both nitrogen and phosphorus fertilizer applications substantially influenced Argentine seed yield. Seed production of Argentine increased linearly from 10 to 250 lbs/A as nitrogen application rate was increased from 0 to 134 lbs/A (without any phosphorus or potassium). The application of 150 lb P₂O₅/A also increased seed yield from 10 to 120 lb/A. It was concluded that the combination of burning Pensacola bahiagrass pasture in spring followed by nitrogen fertilization produced highest clean seed yield of about 135 lb/A. High levels of nitrogen (134 lb/A) without phosphorus, or moderate levels of nitrogen and phosphorus (70 lb/A N and 150 lb/A P₂O₅) applied in spring following close grazing or burning, resulted in highest Argentine bahiagrass seed yields of 250-300 lb/A.

Germination of Pensacola seed averaged 45% (80% viable seed) compared with 85 to 90% germination for Argentine. These values should be of interest when determining seeding rate of bahiagrass.

SALES CONTRACTS FOR CALVES

Jackie Bass
A. Duda and Sons
Moore Haven, Florida

1. A sales contract is no better than the parties involved.
2. It is only a form of communication between parties.
3. Both parties are putting their respective reputations on the line.
4. Even immediate deliveries can benefit by having both parties aware of what is expected of each.
5. Make sure it is clearly defined how and when the buyer will be paid.
6. It is preferable to sell in 50,000 lb. lots (example - 125 calves at 400 lbs.) Be sure the buyer knows if there are short loads involved.
7. Allow a "slide" on the calves after a reasonable weight range.
8. Allow a 3% pencil shrink unless there is unusual circumstances such as hauling to scales or long distances cattle might be driven. Buyers know how much cattle should shrink enroute to destinations.
9. Do more than you're asked - your reputation will benefit.

ROUND BALE SILAGE - A FORAGE HARVESTING ALTERNATIVE

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SUMMARY

This report summarizes the results of 5 years of multi-disciplinary research conducted by the Institute of Food and Agricultural Sciences, University of Florida on the conservation of forages as round bale silage. Grasses and legumes have been harvested using conventional hay making equipment and ensiled as large, round bales of high moisture forage sealed in plastic. When compared to hay, round bale silage offers an alternative forage conservation system that decreases the amount of time spent drying the forage prior to storage. The benefits of this system include reduced rain damage and field losses, and increased flexibility in scheduling harvesting (allowing producers to harvest for optimum forage quality and yield). When compared with chopped silage, the benefits of round bale silage include excellent dry matter recovery, decreased energy costs and lowered initial capital investment. Main disadvantages are increased capital investment and costs for expendable supplies (when the system is compared to hay), and the susceptibility of plastic used to store round bale silage to rodent damage and deterioration under intense sunlight. Field wilting (to increase dry matter at time of storage to 40 to 50%) improves the quality of round bale silage made under Florida conditions. Three to four hours usually is required to accomplish this degree of wilt with bermudagrass. Adding ammonia to round bale silage prevents external molding but may result in undesirable fermentation characteristics, especially when high moisture, tropical forages are ensiled. Microbial inoculation (to promote lactic acid production) temporarily improves the quality of direct-cut, high moisture (<30% dry matter) round bale silage made with bermudagrass, but pH of inoculated silage generally is not lowered enough to stabilize such silage in a high-quality state. The combination of cellulase-enzyme treatment and inoculation, however, has shown potential to improve the quality of bermudagrass round bale silage.

INTRODUCTION

Seasonal variation of forage quality and quantity is a major problem affecting livestock production in Florida (Moore, 1979). Many livestock producers attempt to alleviate low winter forage production by harvesting forage during periods of peak production and conserving it for use during the winter. However, a problem in much of the southeastern

United States is the inability to make high quality hay without rain damage. Based on 50 years of data collected by the Agronomy Department, University of Florida, the lowest probabilities of encountering a 3-day dry period with conditions suitable for making hay in north Florida are from the middle of June through the end of August, a time of rapid forage growth (Figure 1). Rain delayed harvest of forage presents a problem because of the rapid decline in forage quality that is observed with most tropical forages (Moore, 1979).

Recently, the concept of round bale silage has attracted increased attention as an alternative harvesting method because of the greater flexibility it affords with regard to time of harvest (Henderson, 1987). Many producers who have equipment on their farms to produce hay can harvest high moisture forage as large round bales and seal them in plastic (Anderson et al., 1984). The resulting round bale silage can be handled and fed in a fashion similar to round bale hay.

Although limited research has been conducted on the ensiling of tropical forages, the Florida Agricultural Experiment Station was a leader in conducting early research on this conservation method (Becker et al., 1970). In much of this earlier research, low dry matter (DM) intakes were associated with tropical grass and legume silages. An analysis of many of the earlier experiments, however, indicated that silage intake was related to DM content of the original forage. Direct cut silages tended to spoil and were associated with decreased DM consumption. Wilting pangola grass increased DM from 18.8% (direct-cut) to 32.2% and increased DM intake from 1.12% to 1.87% when expressed as a per cent of body weight (Wing and Becker, 1963).

This report attempts to summarize our experience with round bale silage. Much of our research has looked at the influence of field wilting on the effectiveness of this alternative method of harvesting and storing forage. The effects of additives such as ammonia, microbial inoculants and cellulase-enzymes also have been determined. Most of our research has been conducted with bermudagrass and rhizoma peanut, but we believe that the results are similar to those that would be experienced if round bale silage was made with other forages grown in Florida.

HARVESTING

We used conventional hay making equipment to make round bale silage for our research. Forage was cut and mechanically conditioned using a New Holland model 489 haybine. Although most newer balers will roll high moisture bales without difficulty, we initially used a New Holland model 855 baler to make 5' wide bales, but a model 848 baler was used in subsequent years to make 4' wide bales. The larger bales were heavier (up to 2200 lb) than our front end loader could easily and safely handle. Currently, we make bales that are approximately 4' wide and 4 1/2' in diameter. The weights from over 200 bales of this size ranged from

1300 to 1800 lb depending on forage DM (Table 1).

Increasing forage DM (by field wilting) resulted in lower bale weights, but more DM/bale; at 50% DM the dry weight/bale approached that of hay bales that were of similar size made with the same machine. The density of round bale silage, however, has been considerably less than that expected for chopped silage made with comparable forage and stored in bunker or upright silos (30-40 lb/cu ft).

Baling round bale silage takes approximately as long as it takes to make hay. The forage pick-up time in our research (which frequently involved spraying an additive onto the forage during baling) averaged 1.5 to 2 min/bale, but has been as low as 1 min/bale.

STORAGE

Although most of our research was conducted with high moisture round bales stored in plastic, several different plastic storage systems have been used including stacks of bales covered with sheets of plastic, individual bale bags, long tubes of plastic and bales wrapped with stretch plastic. Storage under a large sheet of plastic was useful only when large numbers of cattle were fed the stored forage. Otherwise, spoilage rapidly affected the remaining un-fed bales left after the plastic was removed. Similarly, damage to the plastic sheet resulted in the spoilage of many bales.

Indeed, the single most important factor affecting the success of round bale ensiling is the ability of the plastic covering the high moisture bales to effectively exclude air. The quality of round bale silage is dependent on excluding air from the bale storage system. We have encountered frequent difficulties with rodent damage and ultraviolet deterioration (due to sunlight) of the plastic used in every round bale silage storage system we have looked at to date. It is imperative that high-quality plastic with sufficient thickness and ultraviolet light inhibitor be purchased. Ask the salesman for specifications if there is any doubt about the ability of the plastic to withstand long periods of intense Florida sunshine. Also, plastic must be checked periodically during bale storage and holes repaired with plastic tape.

During the first 2 years of our research we used individual bale bags, but later switched to tubes which could store a number of bales because of the higher cost and labor requirements of the first system (Table 2). More recently, we have used a stretch-wrap system in which each bale is machine wrapped with flexible polyethylene. Cost of the polyethylene in this later system is approximately \$3.00/bale. Each bale is wrapped with four to five layers of polyethylene that is 1 mil thick. Two or two and one-half minutes are required to wrap a bale. The wrap system is our system of choice even though costs are somewhat higher than for the tube system (Table 2). Our reason for choosing the wrap system is that the tight wrap excludes much more air than any of the other systems which were used previously in our research. In addition, holes in the stretch wrap result in less

spoilage than holes in plastic bags or tubes.

EFFECT OF FORAGE DRY MATTER AT TIME OF STORAGE

Most forages that are used by cattlemen in Florida contain little fermentable carbohydrate to fuel the ensiling fermentation (ie., bermudagrass contains 2 to 3% water soluble carbohydrate on DM basis). A high buffering capacity (which resists decline in forage pH during ensiling) also is characteristic of forages in Florida (ie., approximately 5.5 lb lactic acid are required to lower the pH of a water extract of 100 lbs dried bermudagrass from pH 6.0 to pH 4.0). These attributes are similar to those of alfalfa, a forage that many dairy farmers in the midwest ensile and rely on as their predominant source of forage. Dairy farmers in that part of the U.S. have found that field wilting to increase forage dry matter at time of ensiling to 40 or 50% DM improves the quality of alfalfa haylage. The sugar:buffering capacity ratio of bermudagrass is less than 1.0 and is in the range thought to be indicative of forage that is difficult to ensile in a high moisture state (Figure 2; Woolford, 1984). Field wilting bermudagrass to 40 to 50% DM also improves the quality of bermudagrass silage (see Bates et al., 1985 and 1989).

Many of our studies were conducted with relatively immature bermudagrass (5 to 6 weeks regrowth following the previous cutting). Unwilted bermudagrass of 5 to 6 weeks regrowth ensiled directly after harvest typically has a DM content of 23 to 28%. Three to four hours of field wilting during mid-day often will raise the DM of this forage to 40 to 50%. Alternatively, the producer can harvest this forage in the late afternoon and wilt over night to achieve a similar increase in forage DM. The DM content of more mature bermudagrass is higher than that found in comparable immature forage (ie., the DM of direct-cut bermudagrass at 8 weeks regrowth was over 40% in one study and approximately 35% in others). The DM of mature rhizoma peanut, however, is less than 30%.

Field wilting which increases DM of ensiled forage to 40 to 50% restricts the activity of microbes carrying out the silage fermentation. The pH of wilted silage often is higher than pH 6.0. Butyric acid and ammonia (which indicate spoilage), however, usually are lower in wilted silage and overall quality is improved (Bates et al., 1989). The dry matter recovery of wilted bermudagrass round bale silage (40 to 50% DM) is 10 to 15% higher than that of silage made with the same, non-wilted, forage. In some years, immediate improvement in dry matter recovery was observed when direct-cut silage (<30% DM) was field wilted, even if for short periods of time (ie., 1 to 2 h to a DM of approximately 35%; Bates et al., 1989). In other years, the most dramatic improvement in dry matter recovery was observed when bermudagrass was dried sufficiently to raise forage DM to greater than 35% (Figure 3A).

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¹Medipharm, USA.

Cattle also eat more bermudagrass round bale silage when it has been field wilted. This has been observed in studies conducted in two separate years. In 1986, the linear and quadratic effects of forage DM (%) within treatment (control, ammonia, inoculant, cellulase-enzyme, and cellulase-enzyme plus inoculant) on voluntary dry matter consumption (in lb, by cattle weighing 500 lb) did not differ. The overall effect of forage DM on intake was significant ($p < .01$; $n = 98$) and described by the following linear equation: $5.58 + .095X$ ($r^2 = .56$). In 1987, the linear and quadratic effects of forage DM within treatment were different ($p = .0031$ and $p = .0073$, respectively). Individual regressions of voluntary dry matter consumption on forage DM are plotted for each treatment in Figure 3B. The regression of consumption on forage DM in the 1987 study (across all treatments, pens and periods) was $-17.73 + 1.333X - .016X^2$ ($n = 110$, $r^2 = .67$). Most importantly, wilted bermudagrass round bale silage supported higher rates of gain and growth of heifers (Table 3).

Although the gains achieved with wilted, non-treated bermudagrass round bale silage were less than those observed with hay fed cattle, the likelihood exists that certain silage additives may provide additional increases in cattle performance (Figure 3B). Subsequently, in addition to our emphasis on field wilting, we are directing continuing efforts toward assessing the effect of silage additives on the quality of round bale silage made with forages used by Florida cattlemen.

ADDITIVES

Microbial Inoculants

Catchpoole (1970) and Catchpoole and Williams (1969) reported that, unlike silage made in temperate regions, silage made under subtropical conditions is characterized by high concentrations of acetic as well as lactic acid. Similar results were found by researchers in the Caribbean basin (Xande, 1978; Tosi et al., 1975). McCullough (1978) summarized data which indicated that the warm and humid environment of the southeastern U.S. creates poor ensiling conditions which foster proliferation of clostridia and other undesirable silage microorganisms. Also, acetic acid is not as strong an acid as lactic acid, and its accumulation actually buffers against a decline in silage pH below 4.8.

Wilkins et al. (1971) studied the relationship between silage composition and intake. They reported a negative correlation ($r = -.77$) between acetic acid concentration and voluntary dry matter intake when grass silage was fed to sheep. Hamilton et al. (1978) theorized that a substantial decline in DM and digestibility of ensiled subtropical silage was due to extensive gaseous loss of the fermentable portion

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²American Farm Products

³Fermco Development Inc., a subsidiary of Finnsugar

⁴Flieg scores are correlated with intake; high Flieg scores reflect good silage quality. This system rewards silage that has a high concentration of lactic acid, but discounts silage with high concentrations of acetic or butyric acids.

of the forage DM during an acetic acid fermentation. Much of the round bale silage that we have studied has been characterized by relatively high concentrations of acetic acid in relation to lactic acid. Thus, an objective of our research has been to study the effect of inoculating round bale silage with lactic acid producing bacteria.

Epiphytic (initial) lactobacilli counts in non-inoculated, direct-cut bermudagrass round bale silage averaged 10^4 /g forage DM. Three species of lactic acid producing bacteria, Pediococcus acidilactici, Lactobacillus plantarum and Streptococcus faecium, were obtained commercially¹ and grown in batch culture. This culture was sprayed onto the forage as the bales were rolled, raising the lactobacilli counts to 10^6 /g forage DM. Inoculation was effective in increasing the participation of lactobacilli in the silage fermentation (Figure 4A), causing a rapid decline in pH to values lower than those associated with control silage (Figure 4B) and higher lactic acid concentrations [.82 and 1.32% (DM basis) for control and inoculated bales, respectively]. Microbial inoculation temporarily improved the quality of direct cut bermudagrass round bale silage, but pH of the inoculated silage did not decline sufficiently to prevent secondary spoilage from occurring (Figure 5A and B). Dry matter recovery was improved in 2 of the 4 years that inoculants were studied, with most of the improvement seen with high moisture, direct cut silage (ie., Figure 3A; also, see Bates et al., 1985). Inoculation, however, did not significantly affect dry matter intake by growing heifers (500 lb body weight) in either of 2 years [$9.4 \pm .6$ vs $10.0 \pm .7$ lb/hd/d in 1986 (across forage DM ranging from 25 to 50%); and $9.9 \pm .7$ vs $10.8 \pm .6$ lb/hd/d in 1987 for control and inoculated bales, respectively (see Figure 3B)].

Cellulase-Enzyme and Inoculant

Mixed enzyme preparations containing cellulase were obtained from two commercial sources^{2,3} and tested for their ability to increase the extent of fermentation in inoculated round bale silage. Two levels of inoculant were tested, 10^5 and 10^6 lactobacilli/g forage DM. Solutions containing the inoculant and enzymes were sprayed onto the forage as bales were formed. Cellulase-enzyme treatment resulted in a more extensive silage fermentation as characterized by increased concentrations of lactic and acetic acids, and a somewhat lower pH than inoculated round bale silage (Table 4). The enzyme treatments also significantly decreased the number of yeasts and molds found in bermudagrass round bale silage after more than 3 months of storage, but increased total anaerobes (Figure 6). Although Flieg score⁴ was not affected (Table 4), one of the enzyme treatments (referred to as Enzyme 1 in Table 4) increased dry matter recovery (of wilted silage, Figure 3A) and dry matter intake (across the range of forage DM from 25 to 50%, Figure 3B). Enzyme 1 increased dry matter recovery from a mean of 89.7 to 97.9%, and dry matter intake of 500 lb heifers from a mean of 10.1 to 12.6

lb/hd/d (an increase of 25%). Enzyme 2 was not tested for its effect on dry matter recovery or intake. Both levels of microbial inoculant were equally effective in promoting the silage fermentation when used in conjunction with a cellulase-enzyme treatment.

Ammonia

Ammoniation of high moisture hay reduces the growth of yeasts and molds, and decreases the rate of aerobic deterioration (Thorlacius and Robertson, 1984; Woolford and Tetlow, 1984). We have observed a substantial reduction of external molding when ammonia was metered into the sealed plastic container of round bale silage at the rate of 6 to 7 lb/bale (Bates et al., 1985 and 1989). This level of ammonia also increased the crude protein of the treated forage in one year's study (Bates et al., 1989). Higher application rates have been shown to increase the digestibility of low quality forage (Brown et al., 1987).

Unfortunately, ammoniation is associated with undesirable fermentation characteristics, especially when direct-cut low DM tropical forages are ensiled. Dry matter recovery and intake of ammoniated, direct-cut, bermudagrass round bale silage was very poor (Figure 3A and B). Although application of ammonia to bermudagrass wilted to 40 to 50% DM improved the quality of round bale silage (Figure 3A and B), we do not recommend this practice because of the high level of management required for success, and because treatment of silage and hay with ammonia has, on occasion, been toxic to cattle.

CONCLUSIONS

1. Ensiling forage as high moisture round bales provides an alternative forage harvesting-storage system to making hay that decreases the amount of time spent drying the forage prior to storage. The primary advantage of round bale silage is the greater flexibility that this system affords with regard to time of harvest.
2. Wilting bermudagrass to 50% DM increases (by approximately 25%) the amount of round bale silage that is voluntarily consumed by cattle as compared to direct-cut silage. Dry matter recovery and cattle gains also are improved by this management technique.
3. Inoculating bermudagrass round bale silage with lactic acid producing bacteria temporarily improves silage quality, but the terminal pH of inoculated bermudagrass silage in our studies has not decreased sufficiently to prevent secondary spoilage.
4. Treatment of bermudagrass round bale silage with a combination of enzymes containing cellulase (to convert structural carbohydrate of the plant cell wall to fermentable water soluble carbohydrate) and microbial

inoculant, however, showed potential to improve bermudagrass silage quality as gauged by willingness of cattle to eat the silage. Increased dry matter recovery also was observed with cellulase-enzyme treatment, provided the forage was field wilted prior to storage.

5. Although ammonia treatment improved the dry matter recovery and voluntary consumption of wilted bermudagrass round bale silage (40-50% DM) by cattle, this additive was detrimental when added to high moisture, direct-cut bermudagrass round bale silage.

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Table 1. BALE WEIGHTS AND DENSITY OF ROUND BALE SILAGE^{a, b}

| Category | Wilt Time, hr. : | None | 1- 2 | 3- 4 |
|----------------------------------------------|------------------------|------------|------------|------------|
| | Forage Dry Matter, % : | 23- 28 | 35- 40 | 45- 50 |
| Bale Weight, lb | | | | |
| | Range | 1400- 1800 | 1350- 1700 | 1300- 1600 |
| | Average | 1650 | 1550 | 1450 |
| Bale Dry Matter, lb | | | | |
| | Range | 400- 550 | 500- 650 | 650- 750 |
| | Average | 475 | 600 | 700 |
| Bale Density, lb/cu. ft. ^c | | | | |
| | Wet Forage | 26. 0 | 24. 4 | 22. 8 |
| | Dry Matter | 7. 5 | 9. 4 | 11. 0 |

^aAdapted from Kunkle et al., 1988; summary of 200 bales over 2 years.

^bNew Holland 848 baler used to make bales 4' wide and 4 1/2' diameter using bermudagrass (5-6 week regrowth).

^cCalculated using 63.6 cu.ft./bale.

Table 2. ESTIMATED COSTS OF ROUND BALE SILAGE STORAGE SYSTEMS^{a, b}

| Cost Category | Storage System | | |
|------------------------------|----------------|----------------|----------------|
| | Bale Bag | Long Tube | Stretch Wrap |
| Storage Equipment | | | |
| Investment, \$ | --- | 3100 (stuffer) | 7800 (wrapper) |
| Cost/Bale, \$ ^c | --- | 1. 05 | 2. 60 |
| Polyethylene, \$/Bale | 7. 50 | 3. 10 | 3. 00 |
| Labor | | | |
| No. Men | 3 | 2 | 2 |
| Bales/hr | 15 | 20 | 15 |
| \$/Bale ^d | 1. 20 | . 60 | . 80 |
| Total Cost | | | |
| \$/Bale | 8. 70 | 4. 75 | 6. 40 |
| \$/Ton DM | 29. 00 | 15. 80 | 21. 30 |

^aAdapted from Kunkle et al., 1988.

^bEstimated costs based on our experiences and 1988 prices, cost of moving equipment, tractor costs to operate bale stuffer or wrapper not included.

^cEquipment depreciated over 3000 bales.

^dLabor cost calculated at \$6.00/hour.

^eBale estimated to contain 600 lb of dry matter (DM).

Table 3. PERFORMANCE OF GROWING HEIFERS FED BERMUDAGRASS ROUND BALE SILAGE OR HAY, 1988^{d, e}

| Performance trait | Forage dry matter, % | | | | SE |
|----------------------------------------|----------------------|---------------------|---------------------|------------------|-----|
| | 25-30 | 35-40 | 45-50 | 90-95 (hay) | |
| ADG, Full weight ^f | .36 ^a | .21 ^b | .38 ^b | .62 ^b | .15 |
| ADG, Shrunk weight ^g | .17 ^a | .12 ^{a, b} | .27 ^{b, c} | .65 ^c | .11 |
| Change in height ^h | .33 ^a | .67 ^b | .74 ^b | .93 ^b | .08 |
| Change in condition score ⁱ | -1.95 | -1.50 | -1.15 | -1.11 | .07 |

^{a, b, c} Means without a common superscript differ (P<.05).

^dCrossbred heifers averaging 500 lbs body weight; two pens with ten heifers apiece were assigned to each treatment.

^eBermudagrass used in this trial was 6 weeks regrowth and contained 10.1% crude protein (DM basis) and had an in vitro organic matter digestibility of 48.9%.

^fAverage daily gain (lb) measured full weight to full weight over a 76d feeding period.

^gAverage daily gain (lb) measured shrunk weight to shrunk weight over an 88d feeding period.

^hChange in height (in) at hooks over an 88 d feeding period.

ⁱVisually evaluated change in condition over an 88 d feeding period; change in condition score of -1 indicates an estimated loss of condition equal to 1 mm.

Table 4. EFFECT OF CELLULASE-ENZYME TREATMENT ON THE FERMENTATION OF DIRECT-CUT (<30% DM), BERMUDAGRASS ROUND BALE SILAGE. ^a

| Enzyme treatment | Added inoculant ^b | pH | Silage Characteristics | | | Flieg score |
|-----------------------|------------------------------|------|------------------------|---------------|----------------|-------------|
| | | | Lactate, % DM | Acetate, % DM | Butyrate, % DM | |
| None | None | 5.10 | .83 | .69 | .38 | 18.3 |
| None | 10 ⁶ | 4.59 | 1.32 | .82 | .27 | 36.3 |
| Enzyme 1 ^c | 10 ⁵ | 4.31 | 1.10 | 1.56 | .31 | 17.7 |
| Enzyme 1 | 10 ⁶ | 4.16 | 1.31 | 1.77 | .22 | 23.0 |
| Enzyme 2 ^d | 10 ⁵ | 4.31 | 1.72 | 2.41 | .25 | 21.3 |
| Enzyme 2 | 10 ⁶ | 4.40 | 2.17 | 2.78 | .29 | 23.3 |
| SE ^e | | .12 | .26 | .33 | .10 | 7.8 |

^aBermudagrass was 5 to 6 weeks regrowth.

^bNumber of inoculant organisms added/g forage DM.

^cClampzymeTM, Fermco Development Inc.

^dSilage ProTM, American Farm Products.

^eStandard error of the mean.

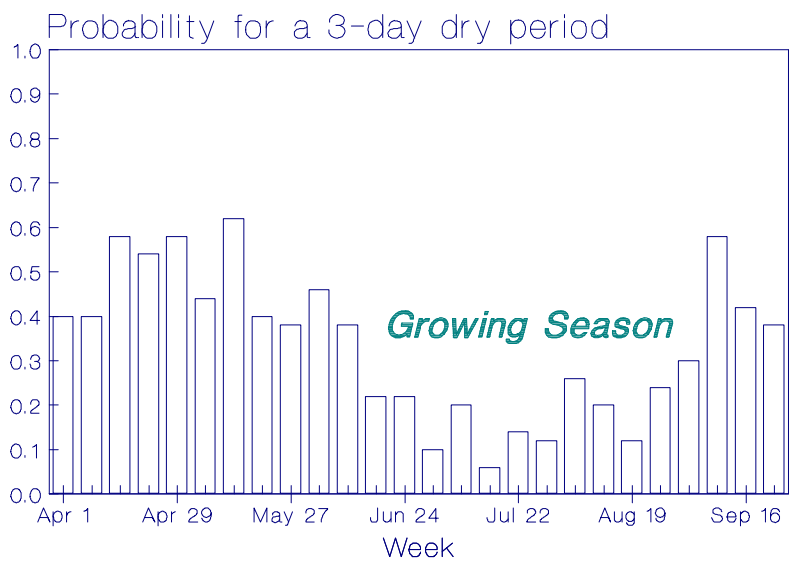


Figure 1. Probability of 3 consecutive dry days out of each week during the spring and summer in north Florida; data collected by the Agronomy Department, Univ. of Florida.

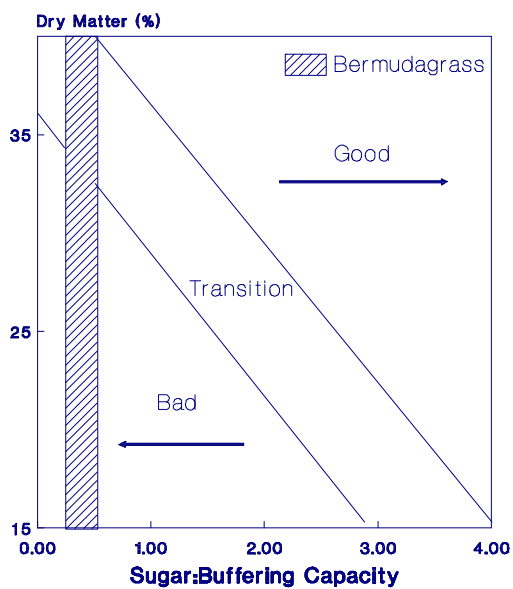


Figure 2. Forage dry matter required for good quality silage as affected by sugar: buffering capacity ratio (adapted from Woolford, 1984). The low sugar: buffering capacity ratio of bermudagrass indicates the need to wilt this forage to a dry matter greater than 40% prior to ensiling.

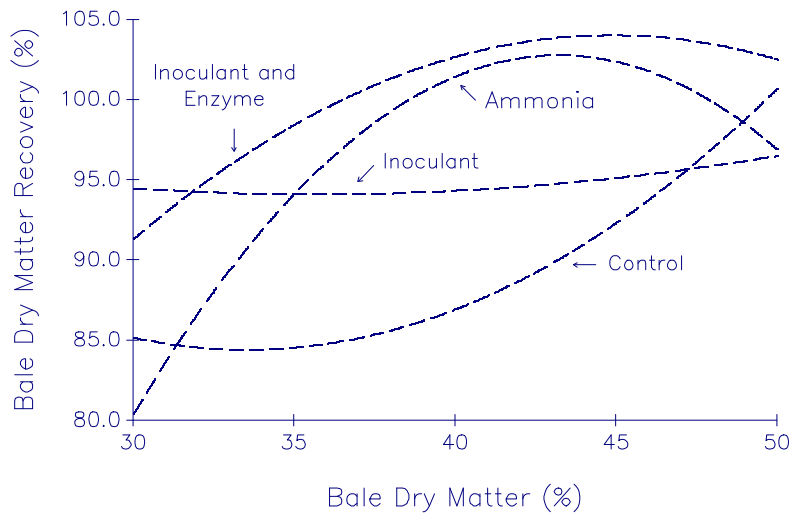


Figure 3A. Regressions of dry matter recovery (%) on dry matter (%) of bermudagrass round bale silage, 1987. Overall regression: $28.12 + 2.846X - .029X^2$; $n = 110$, $r^2 = .43$.

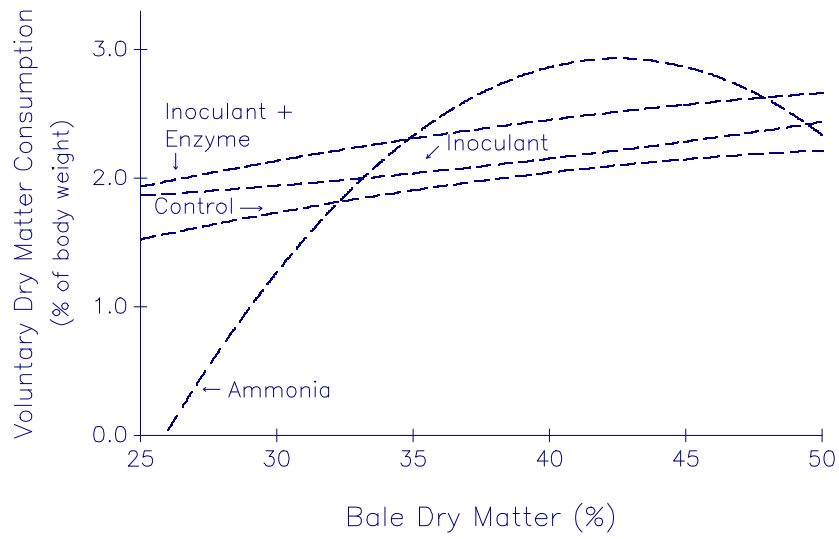


Figure 3B. Regressions of voluntary dry matter intake (expressed as % body weight) on dry matter (%) of bermudagrass round bale silage, 1987. Heifers weighing 500 lb were used in this study.

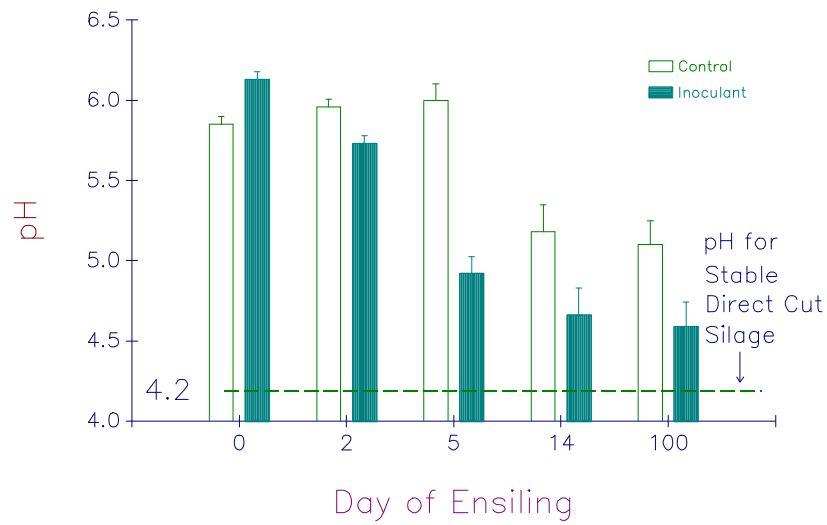
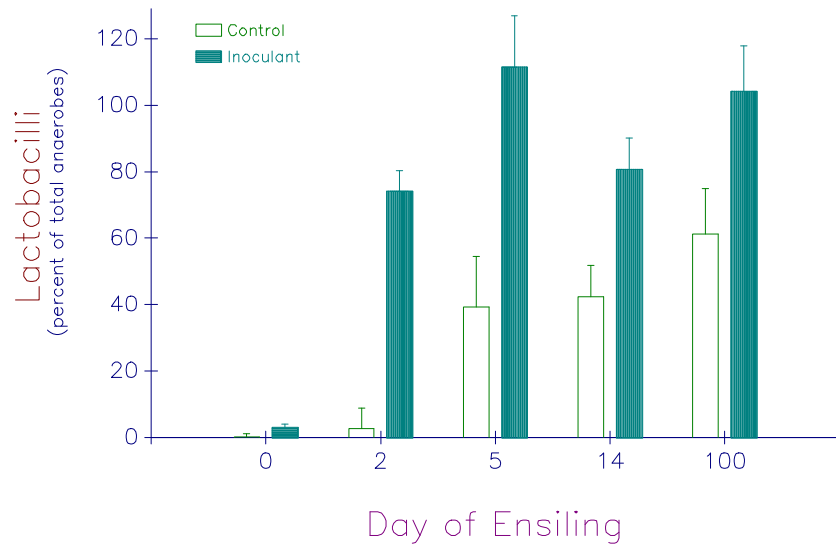


Figure 4. Effect of inoculation with lactic acid producing bacteria on: A. Number of lactobacilli (expressed as a percent of total anaerobic isolates) isolated from direct-cut bermudagrass round bale silage, and B. pH of direct-cut bermudagrass round bale silage. Note that pH of inoculated silage did not fall below pH 4.2, the pH below which silage stability is achieved.

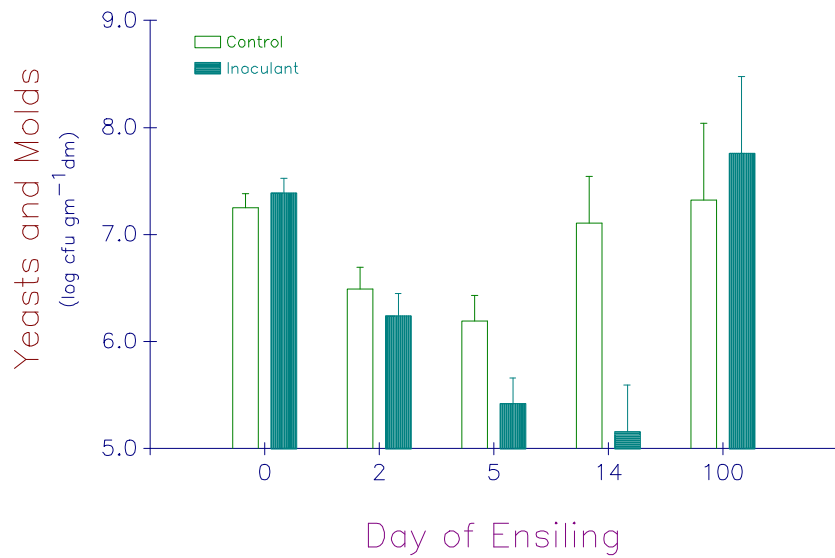
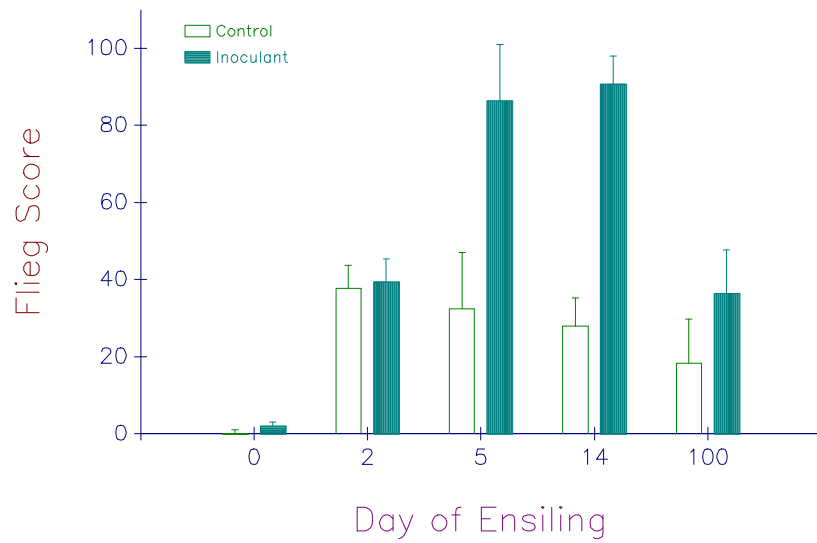


Figure 5. Inoculation of direct-cut bermudagrass round bale silage with lactic acid producing bacteria temporarily improves silage quality as characterized by: A. Increased Flieg score at day 14, and B. Decreased yeast and mold counts (CFU = Colony Forming Unit) at day 14. Unfortunately, the respective values at day 100 show that the inoculated silage was not stable.

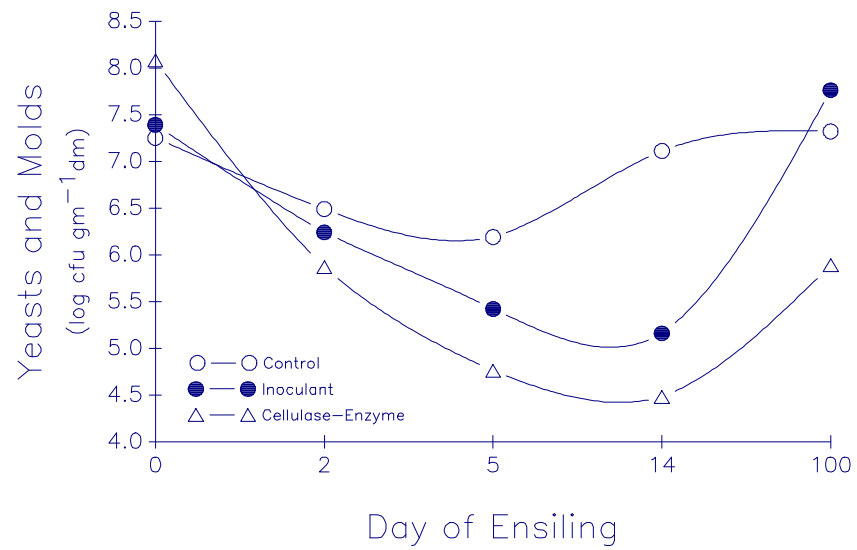
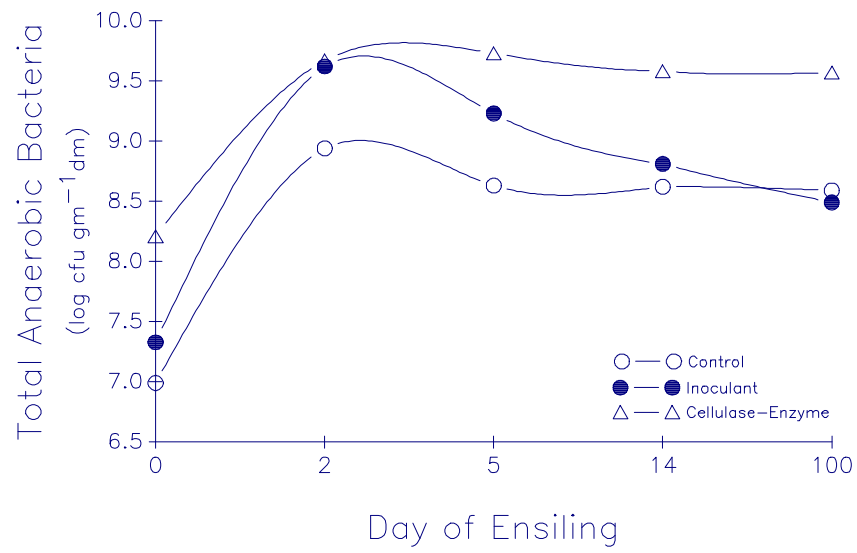


Figure 6. Effect of cellulase-enzyme on: A. Total anaerobes isolated from direct-cut bermudagrass round bale silage, and B. Yeasts and molds isolated from direct-cut bermudagrass round bale silage (CFU = Colony Forming Unit).

CONTRACTS AND MARKETING OF CALVES

Harvey Benschoter
Hi Hat Ranch
Sarasota, Florida

An outline of my talk is as follows:

- Marketing methods used by Hi Hat Ranch.
- Price determines how we sell.
- Forward contract calves for delivery at weaning.
- Terms of contract.
- Contract graze for spring sale of yearlings.
- Why contract graze.
- Some problems encountered.
- Retain ownership to slaughter.
- Contract with feedlot to graze and finish in lot.
- Presentation of calves for grazing.

WATER ISSUES FOR BEEF CATTLE PRODUCERS

Roy R. Carriker
Department of Food and Resource Economics
University of Florida
Gainesville, Florida

FRAMING THE ISSUES

A cattle rancher in Pasco County is convinced that pumping from nearby well-fields of the West Coast Regional Water Supply Authority has caused lakes and ponds on his property to dry up, thus depriving his cattle of their traditional source of drinking water (Koenig, 1986). He must now apply to the Southwest Florida Water Management District for permits to drill wells and to use the water from those wells for his cattle.

A cattle feedlot operator in north-central Florida is required to comply with a consent order negotiated with the Florida Department of Environmental Regulation. The consent order spells out measures intended to reduce nitrate contamination of groundwater from the feedlot operation. It also requires the owner to replace contaminated wells on neighboring properties.

A cattle rancher in the Kissimmee River valley worries about the outcome of a current legal/bureaucratic dispute over the definition of the ordinary high water line, which includes a dispute over who has the authority to define the ordinary high water line (Bush, 1989). Depending on the outcome of the dispute, this rancher and others like him, may discover that they do not in fact own land to which they thought they held title.

Although the Florida beef cattle industry has historically been a low-impact, low-intensity user of land and water resources, the times may have begun to catch up with beef cattle producers. Florida's rapid population growth has generated concern over water quality, competing demand for water resources, and indirectly, intensified the debate over title to low-lying lands near natural watercourses. These and other similar issues are of sufficient importance to warrant a closer look.

WATER REGULATIONS

Department of Environmental Regulation

The Florida Department of Environmental Regulation was created by the Florida Environmental Reorganization Act of 1975, and charged with the authority and responsibility for administering the state's growing body of environmental protection programs. Much of the statutory basis for environmental programs was already on the books at the time, under the Florida Air and Water Pollution Control Act. Codified as Chapter 403 Florida Statutes, Florida's environmental statute directs the DER to, among many other things, "establish a permit system whereby a permit may be required for the operation, construction, or expansion of any installation that may be a source of air or water pollution..." (Florida Statutes, Chapter 403, Section 403.061). DER rules on permitting are published in Chapter 17-4, Florida Administrative Code.

The DER has adopted numerical or descriptive standards that limit the amounts of pollutants allowed in state waters. These standards are based upon the quality of water

believed to be necessary to support the designated use of the particular water bodies. In that context, all surface waters of the state have been classified according to five use categories, the most sensitive (for toxics) being Class I, Potable Water Supplies, and the least sensitive being Class V, Navigation, Utility and Industrial Use (Chapter 17-3.041, Florida Administrative Code). Technology based effluent limitations have also been adopted, as have certain minimum criteria "freeforms," stipulating substances that are banned outright. Water quality standards adopted by DER are published in Chapter 17-3, Florida Administrative Code.

Pursuant to authority granted by earlier safe drinking water legislation, the DER adopted administrative rules in 1982 classifying groundwater sources, with a "G-1" category designating current sources of public drinking water supply, high recharge areas, single source aquifers in limited areas or aquifers set aside for future public water supply. The rule establishes minimum water quality criteria designed to prevent the introduction of dangerous toxic and carcinogenic materials to water supplies.

The state legislature passed the Water Quality Assurance Act of 1983 in order to fill some gaps in statutory authority and program funding needed to fully implement and enforce a comprehensive groundwater protection program. Among other things, the act established a statewide groundwater monitoring network, established a well-field contamination prevention program, directed that all artesian free-flowing wells be plugged by 1995, and created a regulatory program for above and below-ground fuel storage tanks (designed to reduce the threat of groundwater contamination from leaking tanks).

The Warren S. Henderson Wetlands Protection Act of 1984 consolidated in Chapter 403 the regulatory power of DER over all dredging and filling activities using a single set of criteria regardless of whether the waters in question are navigable or non-navigable. The value of wetlands systems to the protection of fish, wildlife and endangered species, was specifically introduced as a consideration in permitting dredge and fill activity. DER rules specifically pertaining to dredge and fill are found in Chapter 17-12, Florida Administrative Code.

DER has a "stormwater rule" (Chapter 17-25, Florida Administrative Code) which reflects an attempt to get a regulatory handle on sources of water pollution that result from runoff associated with heavy rainfall. Specific provision is made in 17-25 for considering "best management practices" in a number of manuals incorporated by reference into the stormwater rule.

Water Management Districts

The 1972 Water Resources Act and subsequent legislation established the administrative framework to manage all waters of the state. An amendment to the state's constitution provided a basis for legislating ad valorem taxation authority to fund water resource management. Statewide authority for various environmentally related programs, including management of water resources, was vested in the Florida Department of Environmental Regulation. The agency was directed to develop, with five water management districts created by the Act, a State Water Use Plan. It was clearly stated in the legislation that powers to manage water would be delegated "to the greatest extent practicable" to the water management districts. The water management legislation is codified at Chapter 373, Florida Statutes. Legislative intent was to provide for continuity

of water management policy statewide, with regional implementation taking into account the variability of water resources over the state.

Five water management districts were formed, encompassing the entire state. Each covers one or more drainage basins. Two of the districts formed under special acts, the Central and Southern Florida Flood Control District (1949) and the Southwest Florida Water Management District (1961), were continued under the Water Resources Act of 1972 with some changes in their boundaries and in their names. The five districts are: 1) South Florida Water Management District (West Palm Beach), 2) Southwest Florida Water Management District (Brooksville), 3) St. Johns River Water Management District (Palatka), 4) Suwannee River Water Management District (Live Oak) and 5) Northwest Florida Water Management District (Havana).

Each district is controlled by a governing board of nine members who reside within the district and are appointed by the governor to serve four year terms. The districts have several sources of funding, the most important of which is ad valorem taxes on lands within the district (subject to a constitutionally imposed millage cap which, for the Northwest Florida Water Management District, is only 0.05 mils).

As a means of implementing the water management provisions in the Act, the water management districts are required to administer a permitting program regulating a) consumptive use of water, b) the construction, repair or abandonment of water wells and c) the management and storage of surface waters.

The water management districts, in carrying out the statutorily mandated regulatory programs, are, like the DER, governed by provisions of the Administrative Procedures Act, codified at Chapter 120, Florida Statutes. Accordingly, the individual districts develop and publish comprehensive and detailed rules by which they administer the regulatory programs mandated in Chapter 373, the water management section of Florida Statutes. These rules are Published in the Florida Administrative Code along with the rules of all other regulatory agencies of the State of Florida. The rules of the water management districts are grouped together in Chapter 40 of the Florida Administrative Code.

As they develop rules in Chapter 40 of the F.A.C., the districts are identified by a letter suffix with Chapters 40A, 40B, 40C, 40D and 40E containing rules of the Northwest, Suwannee, St. Johns, Southwest, and South districts, respectively. Subchapters of 40A---E are numbered to codify rules covering major district functions and that number code is common to all the districts. The individual rules by which each district operates vary between districts. The following is a list of Chapter 40 subchapters and the functions they cover.

40-1

General and procedural - sets forth the administrative authority, policy and procedures by which the district operates. Includes contracting, interagency agreements, permitting, rulemaking and other administrative functions.

40-2

Permitting Water Use - sets forth requirements to obtain a water use permit and the conditions for issuance, denial, modification, etc. of permits. Under subsections 40-20 and

40-21, rules for general water use permits and water use restrictions under water shortage are set forth. 40-22 is used to cover water shortage plans for specific regions of a district.

40-3

Regulation of Wells - controls permitting for well construction, registration of well drillers, construction standards and permit fees. Subsection 40-30 is used to cover general permits for wells.

40-4

Management and Storage of Surface Waters - sets forth rules applied to surface water management systems, wetlands protection and stormwater control. Subsections 40-40, 40-41, 40-42, and 40-44 are used by some districts for rules specific to general permits, regional situations, stormwater discharge and agricultural and forestry water management practices.

40-5

Artificial Recharge - governs permitting requirements for projects involving the introduction of water into any underground formations. This includes disposal of water containing wastes and injection of stormwater for storage and later recovery. Septic tanks are exempt from this rule.

40-6

Works of the District - sets forth permit requirements to connect to, alter, construct in or across, or otherwise make use of any "work of the district". Works of the districts include streams, lakes and other natural water bodies; reservoirs, impoundments, land or facilities owned by the districts.

40-7

Water Levels and Rates of Flow - sets forth operating levels and schedules for controlled water bodies, minimum stage and flow requirements restricting consumptive use withdrawal and flood warning levels.

40-8

Land Acquisition - governs the procedures by which land is acquired, either by district funds or by money from the "Water Management Land Trust Fund" (Save Our Rivers Program). Also covers land trades or disposal. Some districts may develop land management policy within this subsection.

Most of the district functions can affect agriculture because these agencies are required to protect and manage all waters of the state; and these waters fall upon and flow on and under agricultural lands, in addition to being vital to sustain crops and livestock. The affect of any particular district program on an agricultural enterprise cannot be determined without examining the pertinent rules of the district and conferring with district staff. The same must be said of DER rules and programs.

Water Regulation Issues For Beef Producers

Potential issues for beef producers in regard to water quality regulations stem from the fact that runoff from heavy rains can flush heavy phosphorous loadings from animal waste (cow manure) into watercourses and lakes. Dairy farms north of Lake Okeechobee have been at the center of a high-visibility regulatory controversy for several years. Environmentalists, the water management district and the DER, have been concerned about eutrophication of the lake, and attribute much of the problem to increased phosphorous levels in the lake. Much of the phosphorous, in turn, is traced to the dairies. The regulatory structure for controlling water pollution was not well-adapted to non-point sources such as run-off from dairy lots. The DER responded by adopting a specific "dairy rule" which currently applies to dairies in the Taylor Creek, Nubbin Slough drainage areas. The dairy rule mandates the adoption of specific "best management practices" by the dairy operations in the area. The rule does not, at this time, stipulate that water quality standards must be achieved. Adoption of the required management practices constitutes compliance.

However, the South Florida Water Management District has recently adopted a plan for improving water quality in Lake Okeechobee that would establish water quality standards for the watercourses involved and would require the dairies to do whatever is necessary in order to achieve those standards. Spokespersons for agricultural interests have emphasized the need to recognize that water quality in any stream will fluctuate drastically depending upon storm events, season, and temporary changes in agricultural operations. They argue that regulatory programs must take into account the fact that control of contaminants from large surface areas is tenuous at best and may not be manageable in the short term without imposing ruinous costs on producers.

The DER program for regulating "wastewater facilities" requires such facilities to monitor their discharges in order to be sure that quality standards in receiving waters are not violated. In those instances where wastewater discharges were not anticipated, the DER enforces water quality standards by corrective action. As in the feedlot example, the DER negotiates a consent order stipulating corrective measures, monitoring, and such other actions as may be deemed necessary to rectify a problem of water contamination.

Cattle ranchers may face challenges to their attempts to get consumptive use permits for watering livestock and for irrigating pastures. The water management districts may require clear documentation of the quantities of water needed for those purposes.

On the other hand, cattle ranchers may have reason to wonder if water supply development for urban populations will compete directly with agriculture. Such concerns are sometimes overblown for dramatic effect. In some instances, the issue may be valid.

DEFINING ORDINARY HIGH WATER LINE

The February 1989 issue of Florida Agriculture included an informative article entitled "Where Do You Draw the Line?" (Bush). The issue is two-fold: 1) How do we determine where the ordinary high water line is? and 2) Who is legally authorized to decide on the definition of the ordinary high water line? The issue is important because in Florida, the ordinary high water line (OHWL) is the boundary between privately-owned riparian uplands and state-owned sovereignty lands beneath non-tidal navigable waters, according to a 1977 report to the Florida Department of Natural Resources. Last year, the Board of Professional Land Surveyors invoked its authority to "set the minimum technical standards for surveying" and adopted a rule for determining the ordinary high water line for lakes and rivers in Florida. The surveyors' ordinary high water line is based on a definition provided by the U. S. Supreme Court in 1851:

"This line is to be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual and so long continued in all ordinary years, as to mark upon the soil of the bed a character distinct from that of the banks, in respect to vegetation, as well as in respect to the nature of the soil itself." (Howard vs. Ingersoll).

The Florida Department of Natural Resources; however, was also developing rules to define the OHWL. Its definition would apparently put the OHWL higher (landward) of the line proposed by the surveyors. Thus, the DNR definition would encompass low-lying areas and wetlands adjacent to watercourses as a part of the state-owned sovereignty lands. The DNR also insists that the Board of Professional Land Surveyors is not authorized by law to define the OHWL.

The Governor and Cabinet sit as the Board of Trustees of the Internal Improvement Trust Fund, and are responsible for all state lands and works with the DNR to carry out this function. The trustees appealed the surveyors' rule to the Division of Administrative Hearings. The trustees challenge the surveyors' authority to write a rule defining how to determine the ordinary high water line, and contend the rule does not reflect case law in determining where the ordinary high water line belongs. The hearing officer has not, at this writing, rendered a decision.

Apparently, many landowners along navigable watercourses thought they had clear title to land, that the DNR claims, has always been a part of the sovereignty state lands. The effect of a ruling in favor of the trustees and the DNR would, in the view of these landowners, divest them of property that they thought they owned. On the other hand, spokespersons for the trustees insist that the OHWL has not been in doubt until recently when the surveyors stepped in.

This issue could be important for some beef producers by virtue of their status as landowners. Some people have urged the legislature to pass a bill providing a statutory clarification of authority for deciding the issue or for defining the OHWL.

COMMENTARY

Nothing definitive can be said about the implications of water issues for the beef cattle industry over the next decade. If I had to predict, however, I would predict a trend toward more stringent requirements for operations that pose possibilities for contaminating groundwater or surfacewater. For a variety of reasons, we live in a time when people are increasingly concerned about all manner of threats to public health and to the environment. Many of these people know very little about beef cattle producers or the beef industry. Most of them feel no need to learn. Urban populations are growing, and urban delegations in the legislature increasingly control public policy.

These considerations indicate a need for agricultural interests of all kinds to educate, communicate and persuade. At the same time, it will be important for agricultural interests to have credibility with those whom they wish to influence. Credibility comes with knowledge, integrity and demonstrated efforts to "do the right thing."

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FORAGE CHALLENGES AND OPPORTUNITIES IN THE NINETIES

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Many new opportunities, as well as challenges, await us in the coming decade. New and improved forages will be available. New methods of forage conservation as hay or silage are being developed. New ideas and improvements in pasture management techniques will be available. One of the challenges of the nineties will be for the rancher to find ways to efficiently incorporate new technology into his or her ranching operation. First, let us consider some of the opportunities in the way of new forage crops that will be available.

Certified seed of the new Tifton 9 Pensacola Bahiagrass will be on the market this fall, that is assuming there is favorable weather for a good seed harvest this summer. The seed supply will be somewhat limited this first year, but will increase in the future as additional certified seed fields are planted. In plot tests, Tifton 9 Pensacola bahiagrass has produced 30 to 40 percent higher yields than the old Pensacola. Much of this yield increase has come in the first and last harvests of the growing season. This indicates better distribution of forage which is an additional advantage for Florida ranchers. The plant breeding program from which Tifton 9 was developed, continues today. New cultivars with even greater yielding ability than that of Tifton 9 are expected in the future. Two new stargrasses, Florico and Florona, were released last year. Both cultivars are an improvement over the older cultivar, Ona. These grasses are adapted to south-central Florida and planting material is available from the experiment station at Ona.

Work is progressing on the development of new elephantgrasses and crosses of elephantgrass with pearl millet. These grasses are expected not only to be highly productive but also to be a step up in quality compared to other perennial grasses. A new ryegrass that will be called "Surrey" has been developed by IFAS. It has the productivity of Marshall ryegrass but also is resistant to rust disease. Ryegrasses with good rust resistance are especially needed in peninsular Florida. Some seed may be available this fall and should be in good supply in the fall of 1990.

Several new forage legumes are in the works. Seed is being increased of a recently released nematode resistant alyceclover, and a new soft seeded hairy indigo. Work is progressing on the development of an improved variety of aeschynomene and a red clover especially adapted to Florida's climate. Work also continues on screening of perennial peanut lines. Perennial summer legumes adapted to central and south Florida are being

studied. One from the group called stylosanthes may be released as a named cultivar in one to two years. A perennial summer legume called Shaw's Creeping Vigna has proven to be adapted at the Ona Research and Education Center. Seed are available from Australia, but at this time are still quite expensive. Several other forage species are being studied but are now only in the very early stages of development.

Ranchers are challenged to take advantage of some of these new forage crops whenever the opportunity arises. Most of the legumes can be overseeded on established grass pastures. But, new perennial grasses need to be planted on clean-tilled land, and most producers will probably be hesitant to tear up a productive pasture in order to plant a new grass. However, after many years of use, some of our improved pastures need to be renovated due to their lowered productivity. Low productivity may be caused by invasion of smutgrass or other weedy plants and by loss of stand of the perennial pasture grass due to damage from overgrazing or molecrickets. In this situation it may be desirable to plow up such a pasture and plant a high quality annual forage crop for one or more seasons. Growing of the annual forage crops, along with the cultivation needed for seedbed preparation, will help eliminate weed seeds and the remainder of the old pasture grass. After an appropriate amount of time, one of the new perennial grass species can be established.

Timely harvesting of hay in Florida is difficult due to summer thundershowers and high humidity. New forage conservation methods are being developed that will allow for timely harvest and storage of higher quality forage. Roll bale silage treated with certain additives and covered with plastic wrap is one method under evaluation that looks very promising. Along with new methods of forage conservation, greater use of forage testing will be needed. Determining the nutrient content of hay or silage prior to feeding and supplementing with protein or energy should mean greater efficiency in feed use.

Some new and old pasture management techniques may find increased use in the nineties. Greater use of rotational grazing may occur. In some situations rotational grazing may allow for an increase in stocking rate on the ranch. It also may help or reduce pasture weed problems. It makes it easier to control or prevent overgrazing of certain forages. If cattle prices stay favorable over the next five to ten years, this should afford the opportunity to repair fences, renovate or improve pastures and catch up on many of the things that have been postponed in the recent past.

New forage cultivars, new and old pasture management techniques and new methods of forage preservation will be available in the nineties. Use of any or all of this technology to alleviate the age old problems of insufficient quantity of forage or poor seasonal distribution and inadequate or low quality forage will be your challenge for the nineties.

PLANNING, PROPERTY RIGHTS AND VALUE ISSUES FOR FLORIDA LANDOWNERS

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PLANNING

Planning --- "a method of action or procedure... any method of thinking out acts and procedures beforehand" (Random House). A simple definition; an extremely difficult objective to accomplish. Everyone plans, including agricultural landowners. Plans, no matter if they are for simple tasks like daily activities, or for more complex issues such as land use; are dynamic --- they change over time. Flexibility is important in planning because of the dynamics of the process. Few are ever carried out until every "t" is crossed and every "i" is dotted like they were initially formulated. Some people view plans as a list of "thou shalt nots", while others view plans as broad objectives that should be strived for. It really doesn't matter how individuals perceive the issue of government planning in Florida. Planning is an everyday reality in Florida government and Florida agricultural landowners have a vested interest in state planning activities.

Why does agriculture have a vested interest in planning? Farmland represents the most valuable dollar resource in Florida agriculture. Cash receipts from Florida agriculture (Table 1) in 1987 exceeded \$5 billion (USDA) but the use value of land in agriculture for state taxation purposes exceeded \$7.6 billion (1988). The just value of agricultural land, or the value if sold as a fair market transaction, not necessarily in agricultural use, was estimated at \$29.5 billion by Florida property appraisers in 1988 (State of Florida, Department of Revenue, 1988). On the open market, land in agriculture is estimated to be almost six times greater in value than the sales of all major commodities produced by agriculture in the state. Couple that with the fact that about three-fourths of Florida's land area is covered by forests, pasture or cropland (Table 2) and it is easy to see why planning can have an enormous impact on the economic well-being of agricultural landowners.

Planning by state and local governments is not a "johnny-come-lately" endeavor in Florida. According to Bartley, the Florida Planning and Zoning Association introduced legislation to allow cities and counties to plan during the 1951 session of the Florida Legislature. However, a derivative of that planning act, which represents the first generation of planning legislation in Florida, was not passed until 1969 (County and Municipal Planning for Future Development Act). This was followed by the Environmental Land and Water Act of 1972, Chapter 380 F.S., that allowed for lands of critical state concern. That same year a State Comprehensive Planning Act was passed (Chapter 23 F.S.) which was strictly advisory in nature.

In 1975, the Local Government Comprehensive Planning Act, Chapter 163 F.S., was enacted. Adoption of this act was heavily influenced by the first environmental lands study committee (ELMS I) in the early 1970s which concluded that "less than half of Florida's counties exercised any kind of land use control authority" (O'Connell). Unlike the state

planning act, the local planning act was mandatory. It required units of local government to plan for the future. Originally these plans were to be completed by July 1, 1979 but that deadline was extended to July 1, 1981. This act represented a second generation of planning laws, but the first generation of mandatory planning in Florida. According to Everhart and Plummer, the only specific mention of agricultural lands in the plan were that the distribution, location and extent of uses for agriculture were to be designated on a future land use map. The major limitations of the 1975 legislation were that adequate funding required to complete the mandatory planning were not forthcoming from the state, many units of government did not have available staffs to assure a quality plan and once the plan was adopted there was little promise that it would be implemented as adopted (DeGrove, October 1985).

In 1982 Governor Bob Graham appointed a second environmental land management study committee, ELMS II. This group called for adoption of a state plan by the legislature. The state plan was to be combined with regional plans developed in 1980 and then local plans were to be developed that were consistent with state and regional plans. Legislation in 1984 was passed that called for development of a state plan that was to be submitted to the 1985 legislature. The State plan was adopted with minor modifications in 1985.

The state plan identifies broad goals and objectives for 25 different subject areas including agriculture. The state agriculture goal is simply stated: "Florida shall maintain and strive to expand its food, agriculture, ornamental horticulture, aquaculture, forestry and related industries, in order to be a healthy and competitive force in the national and international marketplace."

The third generation of planning laws were adopted in 1985. The Local Government Comprehensive Planning and Land Development Regulation Act (LGCPLDRA), Chapter 163 of the Florida Statutes, is a major component of State Growth Management legislation. The 1985 Act completely overhauled prior local planning laws, and the LGCPLDRA requires consistency with state and regional plans as suggested by ELMS II.

There are eight mandatory elements of all local government comprehensive plans and they include: future land use, traffic circulation, housing, sanitary sewer, solid waste, drainage, potable water, natural water and aquifer recharge, conservation, recreation and open space, intergovernmental coordination and capital improvements. Special elements for mass transit, port aviation and related facilities and coastal management are required for governments who serve a population in excess of 50,000 people. Optional elements can be added by the local government. Minimum criteria for compliance of local government comprehensive plans is established through Florida Administrative Codes, Chapter 9J-5.

Working knowledge of Chapter 9J-5 is essential to understand requirements of the LGCPLDRA, and the potential impacts of the legislation on agriculture. Consider the following examples. A future land use element is required where future land use patterns are to be placed on a map or a map series. Included among the land categories is agriculture. While that sounds like a simple task, it isn't. If this process had been undertaken just a few years ago there would be a series of maps for several north central Florida counties with a vast amount of acreage devoted to agriculture for citrus production. Much of that land today is not used for agriculture because of freezes. Likewise, the need

for pasture and cropland are dictated by personal, economic and weather conditions, and not by a map, nor a planner.

The conservation element of the plan has been another area causing concern among agricultural landowners. The element requires projections of water use by agriculture and other sectors, it is to contain policies for protection of native vegetation, and restricts activities known to adversely effect endangered or threatened wildlife. It has the potential to affect agricultural land use. It also has the potential to affect the competitive position of Florida agriculture if large land blocks have to be set aside to protect vegetation and wildlife species. Why? The fixed costs associated with land ownership are distributed among fewer units of production.

Time and space limitations prohibit detailed discussion about the plan and administrative rule 9J-5. Landowners do need to be aware, though, that all counties and municipalities in Florida are required to have a plan. Plans for all coastal counties and municipalities are due for review by the Department of Community Affairs by June 1, 1990 and for all other areas by July 1, 1991. Plans can only be amended by units of government two times per year except for special circumstances and funds can be withheld from units of government not in compliance. A concurrency clause requires that public services needed to support development be available prior to development so existing levels of services do not deteriorate from increased development.

Few agricultural landowners are familiar with Florida planning laws. Most agricultural landowners haven't taken the time to acquaint themselves with 9J -5. Surprising when you consider the fact that the LGCPLDRA could have a major impact on a \$29 billion resource. It's been said there are three types of people; those who make things happen, those who watch things happen and those who wonder what happened. Many people in Florida, including those involved in agriculture, fall into this third category when it comes to Florida's planning laws.

PROPERTY RIGHTS

The issue of planning and property rights can not be separated. Property right theory is based on the concept that parcels of property are composed of a bundle of rights. The types and number of property rights associated with land are not clearly defined but may include mineral rights, development rights, pesticide rights, cropping rights, air rights, etc. Actions by government, often through regulation of land use, can either augment or diminish the number of property rights on any given parcel.

Agricultural landowners are concerned with the issue of regulation and property rights because of impacts on land values and, in some cases, operating returns. This topic will be discussed later. Landowners are also concerned because, in many instances, there is no compensation for the change in asset value brought about by the regulation. In the legal profession this concern is known as the taking issue. For the remainder of this discussion I will concentrate on this single issue. It is poorly understood by many landowners.

The unjust taking or seizure of property is protected by both the U.S. and Florida Constitutions (Hamann, Juergensmeyer, Looney). Legal scholars often view the taking issue as a poorly defined area of constitutional law. For almost the first hundred years of

U.S. law, a taking of property did not occur unless "the government took actual, physical possession or title to land" for some type of public use (Hamann). This precedent has changed over time. According to Bosselman, *et al.*, "It is an American fable that a man can use his land anyway he pleases regardless of his neighbors. The myth survives, indeed thrives, although unsupported by the pattern of court decisions."

The theory of landownership most accepted today appears to be a social function or social doctrine of property. This theory of ownership has been attributed to Duguit (Juergensmeyer) and Ely (Looney). The social function theory of ownership is based on the concept that land is owned and maintained for societal interests. Ownership of the land then becomes a permitted right, protected by current laws, consistent with the needs of society at a given time. There are a series of court decisions that support this theory and include: Euclid v. Amber Realty Co., Pennsylvania Coal Co. v. Mahon, United States v. Willow River Power Company and Penn Central Transportation Company v. City of New York. Wunderlich and Bierman succinctly state that "all interests in land therefore, are held at the sufferance of society." In Florida, especially if you own land near the Cross Creek area, this social concept of who owns and controls the land is often expressed in the terms of Marjorie Kinnan Rawlings (Siemon):

"Who owns Cross Creek? The red-birds, I think, more than I, for they will have nests even in the face of delinquent mortgages. And after I am dead ... the human ownership of the grove and field are hypothetical. ... Houses are individual and can be owned, like nests, and fought for. But what of the land? It seems to me that the earth may be borrowed but not bought. It may be used, but not owned."

Property rights are defined and redefined by the courts. In a similar manner the courts define when a taking has occurred and if compensation is due the land owner. Another common misconception with taking is that diminution, or a decrease in land values, is the only factor to consider when evaluating if a taking has occurred. Hamann identified eight factors from U.S. Supreme Court cases on takings which the Court considered in their analysis. Those factors are: diminution in value, reasonable use, harm-benefit, nuisance-like effects, reciprocal benefits, existing uses, public trust and balancing.

Several of these "tests" are briefly reviewed. A more complete explanation is summarized in Constitutional Issues in Local Coastal Resource Protection (Hamann). The decrease in value that results from regulation or physical invasion of property is an important determinant when courts consider if a taking has occurred. However, decreases in value of and by itself does not result in a taking of property. In some decisions regarding takings a reasonable use test has been considered. The reasonable use test basically asks what types of uses are still available on the property in question. The general guideline has been that regulations that prohibit development are not a taking if other reasonable uses of the land remain. What has the court system decided were other reasonable uses?

Activities like woodlands, grasslands, hunting, recreation, agriculture, etc. Hamann notes that "existing uses seem entitled to greater protection than speculative future uses." If the owner can use his land in a similar manner that he has in the past, then it is more difficult to prove a taking has occurred. Therefore, compensation is not due. The balancing test basically implies that no single factor of the eight previously identified explains the behavior of the court system with respect to taking rulings. There is some balance between all eight issues. My layman summary of Hamann's analysis is that the court system

operates on an ad hoc basis built around the eight factor tests identified.

All landowners in Florida, including agricultural landowners, can expect government involvement in particular land use decisions. The extent of government intervention, due to the various components of the state growth management act, will be on the front end of proposed land use changes. Rhodes noted that it used to be in Florida that the landowner "... made the first decision on what and when of development." That will no longer be the case.

It appears that current interpretations of the U.S. court system are that compensation for regulation of land use are limited and remote. However, there is an alternative approach that landowners may want to consider when addressing the issue of compensation. The petition of the landowner is ethical in nature and is based on the concept of the desirability of government to compensate for economic losses (Juergensmeyer). Sure, the courts say governments do not have to compensate for regulation in many instances, but is that the appropriate response to take when redistributing economic benefits and losses? Maybe the appropriate course of action for landowners seeking compensation is to make a stronger case to the unit of government that they have a moral responsibility to compensate landowners when costs of land regulation programs are borne primarily by the landowner. This would require a detailed accounting of costs and an educational program for decision makers that would help them understand the economic consequences of governmental actions.

Landowners need to remember that governmental land use decisions can have positive, as well as negative impacts on land values. It would be difficult to argue that many landowners on State Road 192 did not benefit from the governmental decision to allow Disney World development. Likewise, it would be difficult to argue that development of a regional mall, like Oaks Mall in Alachua County, did not result in land value increases for some agricultural property in the vicinity.

LAND VALUE

Land value, as mentioned earlier, can be affected by regulation of government and in several instances decreases in value are not due compensation. How large are the decreases in value that result from regulation and require no compensation? It varies considerably but let me cite a couple of examples from throughout the United States.

In the early 1900s the City of Los Angeles enacted a city ordinance that prohibited brick-making in selected areas of the city. The land in question consisted of a clay bed used to make bricks and was valued at \$800,000. The land had little use for other purposes due to the mining operations that had already been undertaken on the property. The Supreme court ruled, Hadacheck v. Sebastain, that the city ordinance was legal, and the owner was not due compensation even though the value of the property was reduced from \$800,000 to \$60,000, a 93 percent decrease (Hamann). A similar outcome was upheld by the Supreme Court in Miller v. Schoene in the late 1920s. In this case the state of Virginia enacted a law that required destruction of red cedar trees infected with cedar rust. Cedar rust does not destroy cedar trees but, since it could be airborne transmitted, it could destroy an important economic segment for Virginia -- the apple industry. The state destroyed the cedar trees and the owner declared an undue taking of property without compensation.

The Supreme Court decided the state had been forced to choose between the preservation of the cedar trees or the state's apple industry and the apple industry had a greater economic value.² The decrease in value experienced by the landowner was 100 percent. Numerous examples can be found where land values decreased substantially as the result of regulation.

Analogous land regulation impacts can be calculated based on governmental actions. Consider a hypothetical situation in 1989 where a 100 acre block of land is being considered for purchase to develop into citrus groves. The only significant characteristic of the property is a small wetland area. Assume required alterations in the physical landscape were allowed by the purchaser and were not subject to governmental regulation. Using a maximum land bid model developed by Prevatt and Phillips it was estimated THAT³ IN CURRENT DOLLARS A PURCHASER COULD BID UP TO \$14,284 PER ACRE FOR THE 100 ACRE PARCEL WITHOUT REGULATIONS FOR A TOTAL PURCHASE PRICE OF \$1,428,400. WHAT HAPPENS TO THE VALUE OF THE PARCEL UNDER SOME LAND REGULATION SCHEMES? FIRST, ASSUME THERE IS A BOUNDARY SETBACK REQUIRED ON LAND TO PREVENT FUTURE PROBLEMS THAT MIGHT ARISE IF ADJOINING PARCELS WERE TO BE DEVELOPED INTO USES OTHER THAN AGRICULTURE. ASSUME THIS BOUNDARY SETBACK REQUIRES ABOUT 1.5 PERCENT OF THE 100 ACRES. IN ADDITION, THE WETLAND AREA ON THE PARCEL CAN NOT BE DESTROYED AND NEEDS TO BE BUFFERED FROM THE AGRICULTURAL PRACTICE. WETLANDS AND THE BUFFER ACCOUNT FOR ANOTHER 5.0 PERCENT OF THE PARCEL. FINALLY, ASSUME THAT INTENSIVE AGRICULTURAL CHEMICAL USE REQUIRES CONSTRUCTION OF A RETENTION POND ON THE PROPERTY TO MAINTAIN WATER QUALITY STANDARDS. ASSUME THIS RETENTION AREA USES ABOUT 2.0 PERCENT OF THE PARCEL. IN TOTAL, ABOUT 8.5 PERCENT OF THE PARCEL USE HAS BEEN REGULATED AWAY FROM PRODUCTION ACTIVITIES. THE NEXT ASSUMPTION REQUIRED IS THAT NET RETURNS ON THE 100 ACRE PARCEL DROP BY AN AMOUNT EQUAL TO THE AMOUNT OF PROPERTY REMOVED FROM PRODUCTION. THE MAXIMUM BID A PURCHASER COULD AFFORD TO MAKE FOR THE LAND, WITH THE REGULATIONS NOTED, USING THE PREVATT-PHILLIPS MODEL IS ESTIMATED AT \$13,165. A DECREASE IN VALUE PER ACRE OF OVER \$1100, OR \$110,000 FOR THE 100 ACRE PARCEL.

THE ABOVE EXAMPLE IS NOT MEANT TO TRIVIALIZE THE LAND REGULATION PUBLIC POLICY PROCESS. WITHOUT A DOUBT, BENEFITS ARE DERIVED FROM PROGRAMS THAT PROTECT GROUNDWATER SUPPLIES AND RESULT IN HAPPY NEIGHBORS. HOWEVER, THE DISTRIBUTION AND COSTS OF THESE PROGRAMS APPEAR SKEWED. OBVIOUSLY, THE LANDOWNER ENJOYS SOME OF THE BENEFITS ALONG WITH ALL OTHER INDIVIDUALS IN SOCIETY. HOWEVER, IT IS THE LANDOWNER WHO BEARS THE COSTS OF THE PROGRAM TO PROTECT SOCIETY THROUGH A DECREASE IN LAND VALUES.

IN FLORIDA, LAND VALUES APPEAR TO BE HEAVILY INFLUENCED BY POPULATION GROWTH. THIS IS PROBABLY ONE REASON WHY LAND VALUES IN FLORIDA DID NOT SHOW THE DRAMATIC ROLLER COASTER EFFECT OF THE MIDWEST DURING THE FARM CRISIS OF THE MID 1980S. AGRICULTURAL PRODUCTION OPERATIONS OFTEN INCREASE LAND VALUES, BUT IT IS NOT ORANGE TREES NOR FOUR LEGGED CRITTERS THAT EXPLAIN LAND VALUE INCREASES IN FLORIDA. RATHER, THE TWO LEGGED FOLKS MIGRATING TO FLORIDA IN NUMBERS THAT INCREASE FLORIDA'S POPULATION BY ABOUT 900 PEOPLE PER DAY OR BY OVER 300,000 PEOPLE PER YEAR PROBABLY BETTER EXPLAIN FLORIDA LAND VALUES.

FLORIDA'S POPULATION GROWTH HAS BEEN STAGGERING. MORE PEOPLE WERE BORN

IN FLORIDA OR MOVED TO FLORIDA BETWEEN 1977 AND 1987 THAN RESIDED IN THE STATE IN 1950. OVER THE LAST THREE DECADES FLORIDA'S POPULATION HAS INCREASED BY 78.7, 37.2 AND 43.5 PERCENT RESPECTIVELY. FLORIDA'S POPULATION GROWTH IN THE DECADE BETWEEN 1980 AND 1990 SHOULD BE ROUGHLY EQUIVALENT TO THE CURRENT POPULATION OF COLORADO. THE GROWTH IN POPULATION DURING THE 1980-90 DECADE WILL BE LARGER THAN THE CURRENT POPULATION IN 22 STATES IN THE UNITED STATES (BUREAU OF ECONOMIC AND BUSINESS RESEARCH). ALL THESE PEOPLE NEED SOMEPLACE TO LIVE AND MANY ALSO NEED/WANT LAND WITH THEIR HOUSEHOLD.

MANY OF FLORIDA'S LARGEST POPULATED COUNTIES ARE EITHER MAJOR AGRICULTURE PRODUCTION CENTERS OR LOCATED ADJACENT TO MAJOR PRODUCTION CENTERS. A MAP WITH 1986 ESTIMATES OF THE VALUE OF AGRICULTURAL CASH RECEIPTS AND 1986 POPULATION ESTIMATES VERIFIES THE INTERRELATIONSHIP BETWEEN POPULATION AND AGRICULTURE CENTERS. CONTINUED GROWTH IS EXPECTED IN THESE AREAS AND LAND VALUES SHOULD REMAIN ROBUST UNLESS THE PLANNING AND PROPERTY RIGHTS ISSUES DISCUSSED PREVIOUSLY ALTER THE COURSE.⁴

A LOOK AT THE FUTURE

LAND USE CONFLICTS WILL PERSIST AS AN IMPORTANT ISSUE IN FLORIDA. FRICTION BETWEEN THOSE WHO OWN LAND AND WANT TO CHANGE USE OF THE LAND, AND OTHER INDIVIDUALS RESIDING NEAR THE PROPERTY WHO DO NOT WANT THE USE CHANGED WILL BE THE MAJOR CULPRIT OF CONFLICT. MANY OF THE CONFLICTS MAY TAKE THE FORM OF AN URBAN/SUBURBAN VERSUS RURAL DISPUTE. WHY? SOME URBAN RESIDENTS VIEW LARGE OPEN BLOCKS OF LAND AS POTENTIAL OPEN SPACE, PASSIVE RECREATIONAL OUTLETS, AND AREAS OF SCENIC BEAUTY THAT SHOULD BE PRESERVED. MANY AGRICULTURAL LANDOWNERS WHO HOLD THIS TYPE OF LAND ON THE OTHER HAND, ESPECIALLY NEAR URBAN CENTERS, VIEW THE PROPERTY FOR FUTURE URBAN EXPANSION AND DEVELOPMENT.

FLORIDA LANDOWNERS FACE THE POSSIBILITY OF INCREASED LEGISLATION AND REGULATION BY GOVERNMENT. THE FREQUENCY OF INCREASED LEGISLATION AND REGULATION IN FLORIDA WILL PRESUMABLY BE HEAVILY INFLUENCED BY THE AVAILABILITY OF FUNDING BY STATE AND LOCAL GOVERNMENTS TO FUND THE STATE'S GROWTH MANAGEMENT LAWS. INCREASED AVAILABILITY TO FUND GROWTH MANAGEMENT PROGRAMS WILL MOST LIKELY ACCELERATE CONFLICTS BETWEEN LANDOWNERS AND OTHER INDIVIDUALS AND A LACK OF FUNDS WILL PROBABLY RESULT IN LESS STRINGENT REGULATION.

THE COURT SYSTEM WILL GRADUALLY MOVE TOWARDS A CLEARER DEFINITION OF THE TAKING ISSUE. A PRECISE DEFINITION IS PROBABLY NOT POSSIBLE, BUT THROUGHOUT TIME THERE HAS BEEN MOVEMENT TOWARD CLARIFICATION. LANDOWNERS MUST REMEMBER THAT THE U.S. LEGAL SYSTEM INTERPRETS LAWS ENACTED BY LEGISLATIVE BRANCHES OF GOVERNMENT. THOSE LEGISLATIVE POLICY MAKERS ENACT LAWS THAT REFLECT THE VIEWS OF THEIR CONSTITUENTS AND SOCIETY IN GENERAL. IF AGRICULTURAL LANDOWNERS ARE GOING TO HAVE INFLUENCE IN SHAPING THOSE SOCIETAL VALUES, THEY MUST BECOME MORE INVOLVED IN THE POLICY MAKING PROCESS, NOT ONLY THROUGH STATE ASSOCIATIONS, BUT ON AN INDIVIDUAL BASIS.

CONCLUSION

IT IS TIME FOR AGRICULTURAL LANDOWNERS TO BECOME MORE ACTIVELY INVOLVED IN THE PLANNING PROCESS. THIS WILL REQUIRE AN INCREASED EFFORT TO BECOME KNOWLEDGEABLE ABOUT EXISTING LAWS AND REGULATIONS, BE EDUCATED ABOUT FUTURE ISSUES, ATTEND NUMEROUS MEETINGS, HEARINGS AND WORKSHOPS AND TO EXPRESS POTENTIAL IMPACTS ASSOCIATED WITH PROPOSED PLANNING LAWS CLEARLY AND CONCISELY. THE VALUE OF THE LAND RESOURCE IN FLORIDA AGRICULTURE DICTATES THEIR INVOLVEMENT. THE LAND NOT ONLY PRODUCES COMMODITIES FOR FLORIDA AGRICULTURAL LANDOWNERS, BUT IT GENERATES COLLATERAL FOR OPERATING FUNDS AND IS AN INVESTMENT FOR THE LONG-TERM ECONOMIC WELL-BEING OF THE LANDOWNER. LANDOWNERS CANNOT AFFORD TO IGNORE THE POTENTIAL CONSEQUENCES OF LAND PLANNING LAWS AND REGULATION.

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¹INFORMATION PRESENTED BY BARTLEY DURING A WORKSHOP ON FLORIDA PLANNING LAWS, TALLAHASSEE, FLORIDA.

²THE AUTHOR DOES NOT HAVE THE LEGAL BACKGROUND TO COMMENT ON DIFFERENCES IN THIS RULING CONCERNING COMPENSATION AND A RECENT RULING RELATED TO CITRUS TREES DESTROYED IN FLORIDA WHERE COMPENSATION WAS GRANTED.

³OTHER ASSUMPTIONS INCLUDE: ANNUAL EXPECTED NET RETURN GROWTH OF 2 PERCENT, A MARGINAL INCOME TAX RATE OF 28 PERCENT, A 20 PERCENT DOWN PAYMENT ON THE PARCEL, A NOMINAL INTEREST RATE OF 12 PERCENT, A 20 YEAR MORTGAGE AND AN INCREASE IN LAND VALUES YEARLY OF 1.5 PERCENT.

⁴ACCORDING TO INFORMATION RELEASED BY THE FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS, THE SWIFT INCREASE IN FLORIDA'S POPULATION HAS NOT RAPIDLY ERODED THE AGRICULTURAL LAND BASE STATE-WIDE.

TABLE 1. FLORIDA NOMINAL AND REAL CASH RECEIPTS, FOR SELECTED AGRICULTURAL COMMODITIES, 1949-86.

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| YEAR | CASH RECEIPTS | PERCENT CHANGE | REAL \$ CASH RECEIPTS 1972=(100) | PERCENT CHANGE |
|------|---------------|----------------|----------------------------------|----------------|
| 1949 | 428.2 | | 815.77 | |
| 1950 | 488.0 | 14.0 | 911.13 | 11.7 |
| 1951 | 510.3 | 4.6 | 893.85 | (1.9) |
| 1952 | 520.9 | 2.1 | 899.34 | 0.6 |
| 1953 | 545.1 | 4.6 | 926.73 | 3.0 |
| 1954 | 558.7 | 2.5 | 938.20 | 1.2 |
| 1955 | 647.4 | 15.9 | 1,064.10 | 13.4 |
| 1956 | 681.4 | 5.3 | 1,085.20 | 2.0 |
| 1957 | 675.8 | (0.8) | 1,040.81 | (4.1) |
| 1958 | 724.9 | 7.3 | 1,097.67 | 5.5 |
| 1959 | 837.4 | 15.5 | 1,238.76 | 12.9 |
| 1960 | 779.1 | (7.0) | 1,134.06 | (8.5) |
| 1961 | 869.4 | 11.6 | 1,254.00 | 10.6 |
| 1962 | 914.5 | 5.2 | 1,295.14 | 3.3 |
| 1963 | 905.5 | (1.0) | 1,263.43 | (2.4) |
| 1964 | 1004.0 | 10.9 | 1,379.69 | 9.2 |
| 1965 | 998.3 | (0.6) | 1,342.52 | (2.7) |
| 1966 | 1043.3 | 4.5 | 1,359.17 | 1.2 |
| 1967 | 1123.7 | 7.7 | 1,421.33 | 4.6 |
| 1968 | 1220.3 | 8.6 | 1,478.43 | 4.0 |

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| | | | | |
|------|--------|-------|----------|-------|
| 1969 | 1353.5 | 10.9 | 1,559.51 | 5.5 |
| 1970 | 1319.9 | (2.5) | 1,443.30 | (7.5) |
| 1971 | 1458.1 | 10.5 | 1,518.70 | 5.2 |
| 1972 | 1687.8 | 15.8 | 1,687.80 | 11.1 |
| 1973 | 2047.5 | 21.3 | 1,936.17 | 14.7 |
| 1974 | 2145.4 | 4.8 | 1,864.27 | (3.7) |
| 1975 | 2503.6 | 16.7 | 1,990.30 | 6.8 |
| 1976 | 2574.0 | 2.8 | 1,944.99 | (2.3) |
| 1977 | 2761.3 | 7.3 | 1,971.65 | 1.4 |
| 1978 | 3342.8 | 21.1 | 2,222.31 | 12.7 |
| 1979 | 3855.8 | 15.3 | 2,359.44 | 6.2 |
| 1980 | 4061.9 | 5.3 | 2,276.59 | (3.5) |
| 1981 | 4280.6 | 5.4 | 2,193.60 | (3.6) |
| 1982 | 4335.9 | 1.3 | 2,095.85 | (4.5) |
| 1983 | 4625.7 | 6.7 | 2,152.01 | 2.7 |
| 1984 | 4739.6 | 2.5 | 2,123.25 | (1.3) |
| 1985 | 4703.8 | (0.8) | 2,044.68 | (3.7) |
| 1986 | 4688.2 | (0.3) | 1,989.56 | (2.7) |
| 1987 | 5227.0 | 11.5 | 2,147.05 | 7.9 |

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SOURCE: DATA MAINTAINED BY THE AUTHOR FROM VARIOUS USDA AND DEPARTMENT OF COMMERCE PUBLICATIONS.

TABLE 2. MAJOR USES OF LAND, UNITED STATES AND FLORIDA

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PERCENT OF TOTAL

LAND USE U. S. FLORIDA

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CROPLAND 20.9 13.3

GRASSLAND PASTURE 26.2 16.9

FOREST 28.9 47.1

SPECIAL USES 11.9 11.6

OTHER LAND 12.1 11.1

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TOTAL LAND AREA 100.0 100.0

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SOURCE: U.S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL STATISTICS 1984, TABLE 541.

FOREIGN BEEF TRADE ISSUES AND OUTLOOK

Tom Cook
Director, Industry Affairs
National Cattlemen's Association
Washington, D.C.

Cattlemen generally look at foreign trade in two simple categories: imports and exports. While imports have taken up most of our time and energies for the past 25 years, I want to talk about exports first.

Cattle, beef and beef product exports are the opportunities of the nineties. We are becoming active players in the export arena. This is a far cry from where we began in the early 1970's.

The beef industry did not get involved in exports in a serious way until around 1973. The NCA Foreign Trade Committee was formed at that time. A few years later the U.S. Meat Export Federation was organized. The MEF was to be the red meat industry organization charged with the responsibility of product promotion and market development overseas. We all knew that there would not be any sudden results from the MEF's efforts. Compared with the rest of agriculture we were the new kids on the block.

We learned early that all the good promotion and marketing plans were of no value if you didn't have access to the market. We learned that potential markets were closed to us by high tariffs, licensing schemes, restrictive quotas and

other innovative ways to keep us out and to protect the domestic cattle industries.

With the various trade barriers we knew we had to develop trade policies that in cooperation with our government would eventually allow us to sell beef abroad.

As an industry, producers and packers had to get serious. Exports could no longer be a residual market; in other words, sell just what we couldn't sell at home. We needed to make a commitment to be reliable suppliers once a market was established.

Foreign markets have created real challenges, but as we overcome the obstacles opportunities will occur.

Let's look at the various markets.

Japan is by far our biggest export customer. Our increased access to that market is a result of a combination of things coming together over a period of time.

Changing lifestyles, and an improving economy in Japan, set the stage for beef to become an increasing part of the Japanese diet. Beef was popular, and the Japanese consumer wanted more of it, and was willing to pay for it.

However, the Japanese beef producer saw increased imports as a threat to his livelihood. Japanese farmers, through their representation in the diet, have a disproportionate amount of influence. Politically, farmers had clout and were successful in keeping restrictive quotas for many years.

Since 1978, the U.S. and Japanese governments have been through three tough rounds of negotiations. The most

recent round, this past summer, has opened the way for the U.S. to sell significant amounts of beef to Japan. Thanks to a determined U.S. Trade Representative, Ambassador Clayton Yeutter and USDA Secretary Richard Lyng, strong bipartisan support from Congress and a unified beef industry, the Japanese beef quotas will be eliminated by 1991.

What does this mean? Well, in 1986 we sold 481 million dollars worth of beef and veal to Japan. In 1988 it was 841 million dollars and by the year 2000 some experts predict it will be a two billion dollar market.

The Japanese market offers some real opportunities for the 1990's.

Not as optimistic, is the market in the European Community. We are faced with a number of trade barriers to that market.

The most notable is their ban on imports from animals treated with growth promotants.

The EC Hormone ban was adopted with no consideration of the scientific evidence. It was, by their own admission, a political decision. That makes it all that much harder to resolve.

Because of the manner in which the EC imposed this ban, the U.S. government had no choice but to retaliate for the market we would lose. The market was 130 million dollars in 1988. Most of this market, about 90 million dollars, was in variety meats.

The basic principle of the EC directive on growth promotants is one we can not accept. To concede would threaten our domestic market as well as other international markets.

The EC has made an arbitrary, indefensible decision that if allowed to go unchallenged will set a bad precedent and lead to other trade barriers.

We believe the consumer and the market place should make the choice, not governments. Trade restrictions in the name of health and safety should be substantiated and backed up by sound research and scientific evidence.

If we are able to resolve our differences with the EC on this issue, I believe we can recapture much of our market and see some growth in the high quality beef market.

The EC is preparing to drop its country trade barriers, within the community, by 1992. This will make the EC the worlds largest trading block. We do not know whether this will ultimately be an opportunity or challenge.

Other markets we are focusing on are Canada, Mexico, Korea and Taiwan. We face political obstacles and uncertainties in Mexico, Korea and Taiwan.

Beef sales to Mexico in 1988 were 40 million dollars, in addition we sold 113 million dollars of beef cattle. Our variety meat sales have grown, and have partially offset our loss to the EC market.

The Mexican market has had its ups and downs, and at this point it is uncertain whether it will stabilize, grow or decline.

We have seen, for instance, large numbers of feeder cattle

imported from Mexico in recent years; a million head or more per year. However, this year those numbers are down considerably. This is due in part because of a 20 percent export tax imposed by the Mexican government.

The Canadian market for U.S. exports will continue to grow, particularly in the eastern provinces. I expect us to import more cattle and beef from the western provinces into western U.S. markets. This market is the most like ours in both the product and consumer desires. The eastern provinces find it more efficient to import feeder cattle and beef from our eastern states than to ship from their western provinces.

Korea and Taiwan hold major potential. Korea is much in the position Japan was 10-15 years ago. We have some major political hurdles to overcome, but the market is growing. Their import quota in 1988 was 13,000 m.t. Korea expects to import 39,000 m.t. in 1989.

We have come a long way in a few years in exports. We surpassed the one billion dollar mark in beef sales in 1988. In addition, we exported close to 2.5 billion dollars of other cattle and beef products. So our overall export market in 1988 was in excess of 3.5 billion dollars.

Exports are no longer an afterthought in our marketing efforts. They are significant and they offer real opportunities in the 1990's.

IMPORTS

The other side of the coin is imports. The U.S. is not only the worlds largest beef producer, but is also the worlds largest importer of beef.

On a carcass weight basis we import about 2 billion pounds of beef annually. Approximately 85 percent of our imports are fresh, chilled or frozen and are subject to the Meat Import Law. Australia, Canada and New Zealand supply over 75 percent of the beef subject to the law. Central American countries and some European countries make up the difference.

The remainder is cooked, canned and corned beef which comes mostly from Argentina and Brazil.

The Meat Import Law was legislated in 1964. There were major amendments adopted in 1979. The 1979 changes were designed to close the loopholes and change the formula which determined the quota to make it more responsive to the market.

Our industry is the only one in the United States with a statute on the books that determines the level of allowable imports.

It is defensible. It provides producers assurances that the U.S. will not become the dumping ground for other countries' surpluses. It assures consumers of ample supplies of beef. It establishes the game rules so supplying countries can plan and know what to export. It provides U.S. producers the opportunity to plan, knowing what to expect in imports.

Since the law was amended in 1979, it has been managed

by the USDA in accordance with the intent of Congress. Quotas have not been invoked or suspended. However, imports have stayed within the limits of the law.

The law is not perfect. It probably never will be. There are several interest groups who would like to see it repealed. We will continue to come under pressure to repeal or change this law.

But so long as other countries restrict their markets, and fair and open trade does not exist, the NCA will vigorously defend and seek the enforcement of the Meat Import Act.

Imports for 1989 are expected to be about 100 million pounds below what they were in 1988. Australia, Canada and New Zealand have reduced their numbers much like we have in the U.S.

The opening of the Japan market should divert some of Australia's exports from the U.S.

URUGUAY ROUND

If you have not already heard of the Uruguay Round, you will. This is the Multilateral Trade Negotiations within the General Agreement of Tariff and Trade. Ninety-six countries are involved in this process. This round was initiated in Punta del Este, Uruguay, in September 1987.

The United States is a major player in this Uruguay Round. We put some bold proposals on the table. For instance, we proposed to eliminate all trade distorting subsidies. This is being opposed by the European Community. Other countries such as Australia, Canada, Japan, and others have their versions of trade proposals. U.S. success or failure at the MTN may have a significant impact on American agriculture, including the beef cattle industry.

Hopefully, it will lower trade barriers, open markets and level the playing field. Like all negotiations there is give and take. We must be willing to give in order to take. Our job will be to make sure we are getting a fair shake at the bargaining table.

The beef industry has come a long way in just a short period of time. We are part of an international market. We must become active players in trade policy and aggressive marketing. If we do, we will reap the opportunities in the 1990's.

IMPACT OF BEEF PROMOTION

John J. Francis
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Chicago, Illinois

There are many important factors in assessing the effects of advertising:

- Breakthrough
- Growth of awareness
- Effect on attitudes
- Effect on purchase

Breakthrough is the ability of a commercial to make an impression on the viewer. American consumers are constantly bombarded by advertising. As a natural response to this, we all tend to "filter" these out, to ignore them. Effective advertising has to break through the clutter of advertising and be received into the consciousness of the viewer. Breakthrough is usually assessed in a test situation as the percent of a sample who can recall the commercial in the context of a whole reel of "clutter" commercials.

Breakthrough is essential to "advertising awareness". Advertising awareness is defined in terms of the percent of a sample who can recall seeing a commercial on TV or in print and is able to tell something about its content. Awareness grows gradually over the initial period of an advertising campaign, reaching a peak that is usually commensurate with the amount of media dollars spent.

Most advertising is designed to affect attitudes. The reasons for this are complex, but cogent. Basically, most products which are advertised are very important to the advertiser, but are unimportant to consumers: deodorants, detergents, cake mixes and of course beef. For this reason, it

is much easier to influence attitudes about these products than about things such as politics or religion. We can assess the effect of advertising on product attitudes with a good degree of reliability.

However, it is far more difficult to determine the effect of advertising on purchase behavior. There are many factors, other than advertising, which determine purchase. Factors such as supply, price, lifestyle, demographics, personal preference, large-scale social trends, competitive advertising and promotions, etc. Because of this, the relation between advertising and purchase is hard to assess with a high degree of reliability. And finally, it is currently impossible to know the precise relationship between attitudes and behavior. Social scientists have been studying and debating this question for at least one hundred years. Thus far there is no definitive answer. However, it does seem that a change in behavior lags behind a change in attitudes. That is, human behavior carries a certain inertia that slows behavior change, even after attitudes have changed.

BIC ADVERTISING RESEARCH

In the past three years, the BIC has carried out several studies designed to assess these different aspects of consumer advertising campaigns for beef. There are four major sources of research to draw on in gaining a clear overview of these factors:

- Copy testing
- The Advertising Tracking Study (Walker)
- The ROI Analysis of the Behavior-Scan Data
- The Consumer Climate Studies (1985, 1987)

In thinking about this research, it is important to keep in mind the purpose of the advertising. In the case of beef, the

"Good News" and the "Real Food" campaigns have both been designed to affect attitudes. It is assumed that changing attitudes by making them more positive will in turn influence purchase behavior in a positive direction. There are two major reasons for this decision. One is that the beef industry had been suffering from "bad press" for a number of years, producing a profound negative effect on consumer attitudes about beef. The second reason is that beef already enjoyed very high penetration (93% of households use beef) and frequency of use (6 times in two weeks). These conditions make it very difficult for advertising to increase gross volume more than a small amount, especially in the short term of three or four years.

Putting both of these together, perhaps the most we could realistically expect from advertising is that it would help maintain beef's market position, counter-acting the erosive effects of negative publicity.

Advertising Breakthrough

In order to test breakthrough, advertising is subjected to copy-testing. This is done in a test situation in which a consumer is shown the test commercial embedded in a clutter reel of other commercials. The test commercial is evaluated in terms of the percent of the sample who remember seeing it after one viewing, and can recall some of its content.

Copy-testing for the "Real Food" commercials consistently shows that the selected commercials are at or significantly above the norm in breakthrough for food and meat commercials. This information is not only useful in selecting commercials for airing, but in predicting how they will be received by the general public.

Copy-testing also allows us to determine the specific message that is communicated in the commercial. When a commercial is developed, the sponsors have in mind a message they want to communicate to the viewer. However, there is never any guarantee that the message is what will be received. In copy-testing for the "Real Food" campaign, the successful commercials have clearly communicated a message of the positive image of beef: taste, nutrition and fit with modern lifestyles.

Growth of Awareness

Another aspect of awareness is the long term build for a given campaign. This has been measured through the tracking study (Walker). This study has shown awareness to grow consistently over the last three years.

| | Date | | | |
|-------------------------------|------|------|------|------|
| | 5/85 | 1/87 | 6/87 | 5/88 |
| Awareness of Beef Advertising | 35% | 55% | 73% | 88% |

Of particular interest is the significant growth since January of 1987, at the introduction of the "Real Food" campaign.

This significant growth should slow down soon.

Advertising awareness for many products peaks in the 70% range, and may show only small growth after that. Unless the ad campaign changes significantly, the important task then becomes to maintain that awareness.

The level of awareness achieved for the "Real Food" campaign is especially significant in light of the small media budget for this campaign. In 1987, the beef budget was only \$26 million. The latest Walker tracker study shows that milk commodity advertising has an awareness of 81%, but milk has an estimated budget of \$80 million. Branded products of competing meats have much larger budgets. For example branded chicken products have an estimated budget of \$60 million and an awareness level of only 59%.

Effect on Attitudes

After obtaining awareness, advertising must affect attitudes if it is to affect behavior. Effect on attitudes is measured directly in the Walker study, and indirectly in the Consumer Climate study.

The Walker study clearly demonstrates the positive effects of the beef ad campaigns on consumer attitudes about beef. The following table show the difference in positive attitudes between people who are aware of the advertising and those who are not aware.

The pluses show that the aware group has consistently more positive attitudes than the non-aware group. Not all of these differences are statistically significant. However, what is significant is that they are all in the same direction, and that this same finding has been seen over three measuring periods.

DIFFERENCE BETWEEN "AWARE " AND "NON-AWARE"

| | Date | | | |
|--------------------------|------|------|------|------|
| | 3/84 | 2/85 | 6/87 | 5/88 |
| Agreement that beef is: | | | | |
| Good tasting | +4 | +9 | +7 | +7 |
| Good source of nutrients | +8 | +2 | +10 | +4 |
| High quality food | +5 | +4 | N/A | N/A |
| Fits into lifestyle | -2 | 0 | +5 | +8 |
| Important part of | | | | |
| balanced diet | +8 | +11 | +9 | +5 |
| Good value for money | +1 | +2 | +4 | +6 |
| Is leaner | +3 | +2 | +9 | +12 |
| Makes a light meal | +10 | | -5 | +6 |
| +7 | | | | |

The Consumer Climate study provides an indirect corroboration of the effects of advertising on attitudes. Between 1983 and 1985, the study showed a profound erosion in attitudes about beef. However, in the 1987 Consumer Climate study, there was a stabilization of attitudes about beef, and some small suggestion of a turn-around toward better attitudes.

CONSUMER CLIMATE DATA

| | Year | | |
|------------------------------------------------|------|------|------|
| | 1983 | 1985 | 1987 |
| % Who agree that: | | | |
| Fresh beef is: | | | |
| Very nutritious | 62 | 40 | 48 |
| An important part of a balanced diet | 39 | 28 | 36 |
| A main meal must include meat. | 34 | 28 | 24 |
| I plan to cut down on meat for health reasons. | 19 | 26 | 27 |

It is significant that the data suggest a stabilization in attitudes between 1985 and 1987. It was in January, 1987 that the beef advertising and public relations efforts of the beef industry were increased significantly over previous levels. This strongly suggests that the effects of this advertising and promotion have been positive and strong.

In addition, the "Real Food" campaign has bought the beef industry a great deal of free publicity and public relations. The interest generated by the campaign has spawned increased print coverage of beef with stories of interest to consumers. This in turn has spawned the "Beef is Back" image to consumers.

Effect on Purchase

Advertising effects on purchase of a long established product like beef are very difficult to determine. This is due to the intervening variables discussed earlier. Thus even if research can show increased purchase during a period of advertising, there is no way one can be sure this was due to the advertising.

Nevertheless, the BIC has attempted to measure the relationship between advertising and purchase. Some of the measures show that advertising is related to purchase, and some of them do not.

The Behavior Scan data, analyzed in the Return-On-Investment study (ROI), suggest that advertising has no effect on beef purchase. The data in the table below compare three groups - no advertising exposure, light exposure and heavy exposure. Reading across the table in the row marked "Year I", there are no discernible differences among the groups in their volume purchased in each 4-week period of the test.

ROI ANALYSIS: AVERAGE POUNDS PER 4-WEEK PERIOD

| | (No Ads) | | |
|--------------|----------|----------|----------|
| | Control | Light Ad | Heavy Ad |
| Pre-Ad phase | 5.62 | 5.58 | |
| 5.75 | | | |
| Year I | 5.99 | 5.89 | 5.84 |

However, there is another issue which is not captured in this table, the issue of "advertising decay". Advertising decay is the assumption that purchase will decline when the advertising "goes off".

The importance of this is shown in the study. In Year I, there were the three groups: no ad, light ads, heavy ad groups. However, in Year II, the light and heavy ad groups each received the same "moderate" level of advertising, between the previous levels of light and heavy exposure.

When this was done, the level of purchase of the "heavy ad" group declined significantly. This is seen in the table below, reading down the column marked "Heavy Ad". This shows that, when their ad exposure was cut significantly, the heavy ad group showed a sizable decline in purchase volume from Year I to Year II, when compared to the no ad and light ad groups.

ROI ANALYSIS: AVERAGE POUNDS PER 4-WEEK PERIOD

| | (No Ads) | | |
|--------------|----------|----------|----------|
| | Control | Light Ad | Heavy Ad |
| Pre-Ad phase | 5.62 | 5.58 | |
| 5.75 | | | |
| Year I | 5.99 | 5.89 | 5.84 |
| Year II | 5.88 | 5.85 | 5.51 |

This result is meaningful because it suggests what might happen if we did not advertise. By going from a heavier advertising level to a lighter level, we could expect a negative effect on purchase: that household purchase volume might actually decline.

The data in the Walker Study address purchase volume from a different perspective. According to these data, advertising awareness is related to purchase frequency. The table below shows that among people who are aware of the advertising, the medium user group has grown by 10% in a year and a half, at the expense of the light user group. This change is not seen among the non-aware group.

| | 2/86 | 1/87 | 6/87 | |
|---------------------------------------------|-----------|-----------|-----------|-----------|
| | Not Aware | Not Aware | Not Aware | Not Aware |
|))))))))))))))))))))))))))))))))))))))))))Q | | | | |
| User Category: | | | | |
| Light (0-2) | 47 | 52 | 40 | 50 |
| 46 | | | | |
| Medium (3-4) | 36 | 33 | 39 | 34 |
| 34 | | | | |
| Heavy (5+) | 17 | 15 | 21 | 12 |
| 19 | | | | |

In order for a person to be classified as a medium user, he/she must use beef a minimum of one more occasion per two weeks than a light user. So the data suggest that 10% of the aware people are now using beef one additional time each two weeks.

To further complicate the picture, an ad exposure test

points to the beneficial effects of advertising. This test shows the relationship between heaviness of advertising and volume sales by households. The four groups in the table below each saw a different number of advertisements in the test period. The heaviest exposure group bought significantly more beef per household than did the other groups.

the growth of beef stories in food pages of newspapers and women's magazines.

The fourth aspect of advertising - effects on purchase - can be assessed only indirectly. In this area, the data are contradictory. However, the second half of 1987 and the first half of 1988 have seen prices remain high even though beef and total meat supply has been in a high cycle since 1980, according to Tommy Beal of Cattle Fax. This suggests that something is driving demand. It is probable that the advertising is contributing to this phenomenon.

| | G1 | G2 | G3 | G4 |
|------------------|--------|----|--------|--------|
| 1986: | | | | |
| Mean exposures | 5 | 11 | 19 | 45 |
| Ratio: HRS/ADS | 1: 395 | | 1: 213 | 1: 140 |
| 1: 68 Pounds/HH | 68 | | 80 | 70 |
| 97 | | | | |
| 1987: | | | | |
| Mean exposures | 4 | 10 | 16 | 27 |
| Ratio: HRS/ADS | 1: 416 | | 1: 224 | 1: 177 |
| 1: 130 Pounds/HH | 72 | 77 | 67 | 75 |

In the 1987 period of the test, the heaviest ad group saw only half as many commercials, and their volume sales fell off sharply. The other three groups were not affected very much because their exposure rate did not vary significantly from the first year.

Considering both years together, this data suggests that the amount of exposure to beef advertising does have a profound effect on beef purchase volume.

Thus on the most difficult aspect of advertising to assess - relationship between advertising and purchase - the studies that are available support conflicting conclusions.

SUMMARY

Four aspects of advertising were discussed. For three of these, in which it is possible to directly assess the effects of advertising, the data indicate that the beef advertising campaigns are having positive results. The ads perform well in breaking through the clutter of other commercials, and are well liked by consumers. Advertising awareness has grown steadily and significantly, especially considering our small media budget, and advertising has important, consistent, positive effects on consumer attitudes.

In addition, the newest campaign, "Real Food", has brought a tremendous amount of free publicity and public relations for the industry, having positive effects on consumers and industry segments alike. The use of celebrities has brought national media attention to the campaign as evidenced in media coverage. The campaign has also fueled the "Beef is Back" phenomenon, shown in

RELATIONSHIP OF MUSCLING TO PRODUCTION TRAITS

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INTRODUCTION

Beef cattle exist because they are a means for converting forages -- a non-human food resource --, and to a lesser extent, excess grains and by products, into a tasty, nutritious and healthful human food -- BEEF. This will continue to be the role of beef cattle.

A sound breeding program will concentrate on improving the traits that are of great economic value -- adaptation, reproduction (early puberty, fertility, calving ease), maternal ability, growth rate and carcass value (yield and quality). Most of the beef cattle breeding research in Florida has been concentrated on the first three of these; adaptation, reproduction and maternal ability.

Attitudes of consumers and resulting reaction by the major meat packers and retailers have led to greatly reduced outside fat on retail beef cuts in the U.S. Most of this reduction of fat on retail cuts has, however, been due to trimming by the packers and retailers. The U.S. block-beef supply consists of about 5% Yield Grade 1, 46% Yield Grade 2, 42% Yield Grade 3, 5% Yield Grade 4, and 2% Yield Grade 5. Dr. Gary Smith (1988) stated that industry needs are 20% Yield Grade 1 and 80% Yield Grade 2, and no carcasses of Yield Grades 3, 4 and 5. His rationale was based on the fact that the average Yield Grade 3 carcass, with 34.9% separable fat, is still too fat to be acceptable to the supermarket trade.

Excel Corporation presently has a system of premiums - discounts based on muscling and cutability, and it is likely that other packers will soon follow suit. It should be obvious, therefore, that it is time for the Florida cattleman to start placing some emphasis on the last two traits listed in the second paragraph: growth rate, carcass yield and quality.

HOW DO FLORIDA CATTLE MEASURE-UP?

Beef cattle breeding programs used in Florida must:

1. Improve carcass cutability and quality,
2. Continually improve the ability of the cows to reproduce annually and to wean heavyweight calves,
3. Produce feeder-stocker calves that grow rapidly and efficiently on forage and (or) concentrate feedstuffs in both warm and cool climate regions of the U.S.

The need for improved muscling in Florida calves is

clearly shown by the data presented in Table 1. Nearly half of the calves sold through Florida auctions graded U.S. No. 2 for muscle-thickness. Since the sale price for No. 2's averaged \$10 to \$15 per hundred weight less than the average paid for No. 1's, this represents a loss in potential profit of \$40 to \$60 for each 400-weight calf.

TABLE 1. USDA GRADE DISTRIBUTIONS OF CALVES SOLD THROUGH FLORIDA AUCTIONS

| Grade | 1985 | 1986 | 1987 |
|----------|-------|-------|-------|
| Large 1 | 8.2 | 8.7 | 8.4 |
| Medium 1 | 40.2 | 36.1 | 38.9 |
| Small 1 | 8.1 | 5.3 | 5.4 |
| | 56.5 | 50.1 | 52.7 |
| Large 2 | 8.2 | 9.7 | 11.7 |
| Medium 2 | 27.9 | 34.2 | 32.4 |
| Small 2 | 7.4 | 6.0 | 3.2 |
| | 43.5 | 49.9 | 47.3 |
| | 100.0 | 100.0 | 100.0 |

^aSource - Florida Agricultural Statistics. Livestock Summary 1987.
^bAverage \$10-\$15 price advantage for #1's over #2's within frame size.

MUSCLING AND PRODUCTION TRAITS

Carcass traits. Research has shown that muscle-thickness score in feeder cattle is related to muscle to bone ratio in the carcass, and that at a given degree of fatness, is related to the amount of saleable lean meat (muscle) obtained from a beef carcass (Tatum, et al. 1986, Table 2). In that study, they purchased 324 yearling steers representing the nine frame x muscle-thickness combinations in the U.S. Feeder Cattle Grades (36 steers per frame x muscle-thickness class, i.e., Large 1, Large 2, Large 3 ----- Small 3). Muscle-thickness classification was based on visual assessment of thickness of rear quarter, forearm and gaskin -- due to muscle expression and independent of differences in fatness. Steers were all fed the same diet and were serially slaughtered at 28-day intervals (days 0, 28, 56, 84, 112 and 140) during a 140-day finishing trial.

At constant carcass weight, the No. 1 steers (heaviest muscled) had a higher percentage of separable muscle, less separable fat and a higher muscle to bone ratio than the No. 2 and 3 steers (Table 2). The No. 2 steers had less separable bone and a higher muscle to bone ratio than the No. 3 steers. When carcasses were adjusted to a constant percentage of fat, the data show that the No. 1 steers had the heaviest weight (1068 lb vs 1002 and 982 lb for No. 2 and 3 respectively), and that the percentage of separable bone decreased as muscle-thickness grade decreased from No. 1 to No. 2 to No. 3. Again, the muscle:bone was

highest for No. 1 steers (3.94:1), followed by the No. 2 (3.73:1) and No. 3 steers (3.51:1).

TABLE 2. CARCASS COMPOSITION OF CATTLE THAT HAD MUSCLE- THICKNESS SCORES, AS FEEDERS, OF NO. 'S 1, 2 AND 3.

| Muscle- Thick- ness Grade | Live wt. lb | seperable, % | | |
|------------------------------------------|-------------------|-------------------|-------------------|-------------------|
| | | Muscle (M) | Bone (B) | Fat |
| <u>Constant Carcass Wt. ^a</u> | | | | |
| No. 1 | 63.4 ^c | 16.4 ^c | 20.2 ^c | 3.93 ^c |
| No. 2 | 60.8 ^d | 16.3 ^c | 22.9 ^d | 3.73 ^d |
| No. 3 | 60.5 ^d | 17.0 ^d | 22.5 ^d | 3.48 ^e |
| <u>Constant fat^b</u> | | | | |
| No. 1 | 1068 ^c | 62.2 ^c | 15.8 ^c | 3.94 |
| No. 2 | 1002 ^d | 61.5 ^d | 16.5 ^d | 3.73 |
| No. 3 | 982 ^d | 60.7 ^e | 17.3 ^e | 3.51 |

^aCarcass wt. adjusted to geometric mean of 566 lb
^bAdjusted to a mean of 21.98% fat
^{cde}Means in the same column with different superscripts differ (P<.05).
 Adapted from Tatum et al. (1986).

The above data agree with those of Kauffman et al. (1973), where they compared carcasses from steers selected for heavy muscling (muscular) and light muscling (non-muscular) (Table 3). The muscular steers were crosses of beef breeds (Charolais crossed with Hereford and Angus, and some Angus x Hereford crossbreds), whereas the non-muscular steers were primarily of dairy breeding.

TABLE 3. COMPOSITION OF PELVIC LIMBS FROM MUSCULAR AND NON-MUSCULAR STEERS

| | Muscular | Non-muscular |
|---------------------|---------------------|--------------|
| Fat, % | 19.8 | 18.2 |
| Dissectable bone, % | 16.7 ^a | 20.6 |
| Fat-free muscle, % | 63.5 ^b | 61.2 |
| Muscle: Bone | 3.8: 1 ^b | 3.0: 1 |

^aP<.05
^bP<.01

The muscular steers had 2.3% more muscle even though they were slightly fatter. If fat were standardized to 20%, and it was assumed that the muscle: bone of the pelvic limb was the same as the entire carcass, then a 1200 lb muscular steer would have about 24 lb more fat-free muscle than equal weight non-muscular steer. Extremes in muscle:bone are found in double-muscle cattle. Kauffman et al. (1976) reported that double muscled Angus and Charolais steers produced carcasses with an average muscle to bone ratio of 5.77:1.

Growth rate. Tatum et al. (1986) reported that muscle-thickness score (U.S. No. 1, 2 and 3) did not significantly influence absolute growth rate. Buchanan et al. (1982), however, reported low, but positive phenotypic correlation

between muscling score and growth. They also reported that selection for yearling weight was improved when muscling score was included in the index.

Muscling has often been measured as pounds of retail product per day of age (Cundiff, 1986; Dinkel and Busch, 1973; Cundiff et al. 1971), and as ribeye area (Dinkel and Busch, 1973; Cundiff et al., 1971). Since both of these measures are highly correlated with growth rate, live animal weight and carcass weight, they are really measures of growth, and not of muscling differences among animals of similar sizes and weights. Genetic correlations between different measures of growth and muscling are shown in Table 4.

TABLE 4. GENETIC CORRELATIONS BETWEEN SOME GROWTH AND MUSCLING TRAITS^a

| Measures of Birth muscling | Birth weight | Feedlot daily gain | Age Constant carcass wt | Final weight |
|-------------------------------|--------------|-----------------------|----------------------------|-----------------|
| Ribeye area | .31 | .49, .34 | .66 | .54 |
| Muscle score | | .26 | | |
| Fat thickness | -.27 | -.25, .05 | .34 | -.56 |
| Cutability | | .50 | -.33 | .74 |

^aAdapted from Cundiff et al., 1971; Dinkel and Busch, 1973; Koch et al., 1982.

MUSCLING AND COW TRAITS

Extreme muscling has been shown to result in serious reproduction problems. Research has shown that double-muscle cattle exhibit the following characteristics: delayed puberty, reduced fertility, reduced milk production, and increased birth weight and smaller pelvic area resulting in increased calving difficulty (Oliver and Cartwright, 1968; Tinker, 1987). It is probable that selection for extremes in muscling would result in an increased incidence of double muscling, and the associated negative effects on reproduction.

No real data exist on the relationships among variations in muscling within the "normal" range and cow traits. A very extensive breed comparison study at the Roman L. Hruska U.S. Meat Animal Research Center (MARC) at Clay Center, Nebraska (Cundiff, 1988), indicates that reproductive and maternal traits are not 100% related to growth rate and cutability (Table 5).

A relatively large study (MacNeil et al., 1984) was conducted at MARC to investigate the correlations among carcass traits in steers and reproductive and maternal traits in their half-sisters. Two of the carcass traits studied were fat trim and retail product, both of which are highly correlated with carcass Yield Grade (Table 6).

The unfavorable genetic correlations shown in this study suggest that selection for increased growth and cutability (reduced fat trim) could result in delayed puberty, reduced fertility, longer gestation, heavier birth weight, greater

calving difficulty and lower milk production. It should be emphasized, however, that neither fat trim nor retail product is a direct measure of muscling, but are more measures of mature size, growth rate and fatness at the time the animal reached slaughter weight or age.

TABLE 5. BREED CROSSES GROUPED INTO BIOLOGICAL TYPES ON THE BASIS OF FOUR MAJOR CRITERIA^{ab}

| Sire Breed | Growth rate and Mature size | Lean to fat ratio | Age at puberty | Milk production |
|-----------------|-----------------------------|-------------------|----------------|-----------------|
| Jersey | x | x | x | x |
| Hereford-Angus | xx | xx | xxx | xx |
| Red Poll | xx | xx | xx | xxx |
| Brangus | xxx | xx | xxxx | xx |
| Santa Gertrudis | xxx | xx | xxxx | xx |
| Brahman | xxxx | xxx | xxxx | xxx |
| Sahiwal | xx | xxx | xxxxx | xxx |
| Brown Swiss | xxxx | xxxx | xx | xxxx |
| Gelbvich | xxxx | xxxx | xx | xxxx |
| Holstein | xxxx | xxxx | xx | xxxxx |
| Simmental | xxxxx | xxxx | xxx | xxx |
| Limousin | xxx | xxxxx | xxxx | x |
| Charolais | xxxxx | xxxxx | xxxx | x |
| Chianina | xxxxx | xxxxx | xxxx | x |

^aIncreasing number of x's indicates higher levels of performance and older age at puberty.
^bAdapted from Cundiff, 1988.

CONCLUSIONS

1. Florida calves need more muscle.
2. Muscling (muscling score or ribeye area) should be incorporated into a sound bull selection program.
3. Extremes in muscling (double muscled or approaching double muscled) should be avoided.

TABLE 6. GENETIC CORRELATIONS AMONG CARCASS COMPOSITION OF STEERS AND REPRODUCTIVE AND MATERNAL TRAITS OF THEIR HALF SISTERS

| Female traits | Steer carcass traits | |
|-------------------------|----------------------|----------------|
| | Fat trim | Retail product |
| Age at puberty | - .29 | .30 |
| Weight at puberty | - .31 | .08 |
| Conceptions per service | .21 | .28 |
| Gestation length | - .07 | .13 |
| Calving difficulty | - .36 | -.02 |
| Birth weight | - .07 | .30 |
| Progeny preweaning gain | - 1.25 | -.26 |

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PEOPLE AND AGRICULTURE: CAN THEY COEXIST?

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The overriding concern of people in agriculture: ranchers, farmers and technical experts, is how to change production practices to stay competitive in agriculture's dynamic markets without stumbling financially. Coexistence is a relatively new management concern; one requiring increasing amounts of time learning about regulations and money to comply with them.

But at root, coexistence is not as much a technical management problem as it is a people problem. What is needed are people in agriculture, and people outside agriculture, understanding each others' concerns and working at ways to coexist amicably.

Agricultural people will have to take the lead in what will be a long-term educational and communication task. Something like two-thirds of Florida's elected representatives come from the eight most populous counties, and urban dwellers outnumber people in agriculture by about ten to one.

People problems are not new, we've always had to get along with neighbors. Neighboring has never been easy. Every rancher has had a nitwit neighbor who wouldn't help keep the fences up, and every city dweller knows a neighbor whose dog didn't respect property lines. One thing is certain: the best way to deal with people problems is to settle them personally without involving the courts. The problem is that the more removed neighbors are, and the less they know about one another, the harder it is to communicate.

There are at least three answers to the question, "Can people and agriculture coexist?", and we'll take them up in turn. Our interest is in why they must, why they should, and how they can.

They must

People inside and outside of agriculture must get along because both need a healthy agriculture. For the most basic reason: If, or when, the bullets fly again, we all want our food supply assured and nearby. Thank God it is in America. And it will stay that way; differences will dissolve before agricultures' basic health is jeopardized.

In addition to providing food, agriculture is a must for water recharge. And for nurturing a nucleus of wildlife populations in suitable habitat outside the limited space that is financially feasible in publicly owned parks.

They Should

Coexistence begins by both parties realizing that the basic concerns for a healthy agriculture and a clean environment are shared. Everybody wants clean streams and lakes, especially people who live in the country. Everybody wants as much wildlife as possible, especially people who live in the country.

Ranchers are, almost to a man, die-hard conservationists. My Uncle John wouldn't let his blood-thirsty young nephew kill a coyote. "They belong here, son", he said. And going back a little further in time, the Government didn't save the buffalo, a rancher

named Goodnight did. He had saved a small herd from which most of the present buffalo herd are descendent.

Here in Florida, panthers are an endangered species, and private ranches (Babcock and Alico, to name two) have had far more to do with preserving Florida panthers than the Florida legislature and all the environmental groups put together. And the largest population of nesting bald eagles in the Southeast is in the Cross Creek area on privately owned land, where they have been protected by the people who live there. Nests on publicly owned land are largely abandoned. This side of private land ownership is virtually unknown to the public.

Agriculture pays its way through property taxes earned while producing abundant supplies of agricultural products which have made it possible for U.S. consumers (that's all of us) to spend a steadily diminishing percentage of disposable income for food.

Agriculture produces income while providing open space and making few demands on society for roads, sewers, and police services.

There are no one-way economic streets. People who come in increasing droves to seek Florida sunshine do bring with them traffic snarls, increasing demands on water supplies, and regulations that tax ranchers' patience and pocket-books. But those same people bring money which hold land prices up, and thus put a strong foundation under Florida agricultural balance sheets.

Urban people's desire to escape an increasingly plastic world also creates possibilities for increasing operating income through turf grass sales, hunting and fishing leases, and endless other opportunities for those land-owners willing to supply open-space amenities in attractive packages. Few other places in the nation are so blessed. Ranchers in West Texas can pray for rain and hope the cow markets hold, and that's it.

They Can

Coexistence is a communication problem, and agricultural people have more at stake, sooner, than do urban people. Since agricultural people are so outnumbered, communication is going to have to be a high priority for everyone in agriculture.

○ Why not host some media tours? Let the eyes and ears of the public see first-hand what you are doing to preserve wildlife; to manage the land so that your grand-kids can know the grand country in which cattle are raised.

○ Nobody can educate parents like kids. Host tours of young people. Let them see, feel, taste and smell the environment which you cherish, manage and protect.

○ Talk to civic clubs. Eloquence isn't necessary, the truth carries conviction. Don't go to pick a fight or to vent frustrations, but to explain how you really make a living, what a bite out of income property taxes are and the investments you have made to coax an income from agriculture in the face of low and uncertain returns.

○ Serve on committees and planning boards. Frustrating and time consuming as that may be, the importance of friendly personal contact cannot be overstated. Also some County Extension personnel are providing an important dual role by serving on local planning boards. They educate the planners about agriculture, and acquaint agriculturists with compliance requirements.

○ Ben Franklin said that the only thing more expensive than education is ignorance. Education is slow, but progress is being made. "More health professionals now recognize, and say, that lean cuts of beef fit into fat-restricted diets." (NCA, p. 2). And in Europe, where the animal-rights

movement originated, "The public is getting tired of the movement." (Behar, p. 44). So progress is indeed possible on land-use planning and regulation.

CONCLUSION

Agriculture and people can coexist, and they will, because people inside and outside agriculture need each other. Communication is everybody's responsibility, and agriculture has a real success story to tell about its role in preserving the environment while paying its way, demanding little from society and returning much.

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ENVIRONMENTAL CONCERNS FOR AGRICULTURE

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ENVIRONMENTAL CONCERNS FOR AGRICULTURE MAY NOT BE THE PROPER TERM FOR THIS TALK. A MORE APPROPRIATE TERM MIGHT BE, "CAN WE SURVIVE" OR "WHO WILL SURVIVE".

THE FIRST THING MOST PEOPLE THINK ABOUT WHEN THEY HEAR THE TERM "ENVIRONMENTAL PROTECTION" IS POLLUTION. THIS TYPE OF THINKING MAY BE JUSTIFIED ON THE PART OF "NORTHERN IMMIGRANTS" WHO HAVE SEEN RAW SEWAGE AND INDUSTRIAL WASTE DUMPED INTO THEIR RIVERS AND STREAMS. AGRICULTURE IN FLORIDA HAS BEEN ACCUSED, TRIED, FOUND GUILTY, SENTENCED AND HUNG WITHOUT ANY DATA EVIDENCE EVER BEING PRESENTED AGAINST US. WE HAVE BEEN CONSIDERED TO BE THE VILLAIN IN THE BLACK HAT. WE ARE COMPARATIVELY SMALL IN NUMBERS AND FOR THE MOST PART UNORGANIZED; THEREFORE, WE HAVE BEEN EASY PREY.

THE ENVIRONMENTAL HORSE HAS BEEN RIDDEN ALL THE WAY TO WASHINGTON, D.C. BY NUMEROUS POLITICIANS, PASSING REGULATIONS, APPOINTING POSITIONS AND BOARD MEMBERS, USING BIASED REPORTS AND WHO KNOWS WHAT ALL, JUST FOR THE SAKE OF POPULARITY WITH THE VOTING PUBLIC.

AGRICULTURE HAS A GENUINE CONCERN FOR PROTECTING OUR ENVIRONMENT; IT IS OUR LIVELIHOOD AND LIFE'S BLOOD. ENVIRONMENTAL CONCERNS FOR AGRICULTURE CAN BE ENTIRELY DIFFERENT FOR DIFFERENT TYPES OF OPERATIONS DEPENDING ON WHICH AREA IS GETTING THE MOST MEDIA ATTENTION AT THE TIME. MOST OF US ARE ALREADY AWARE OF THE DEPARTMENT OF ENVIRONMENTAL REGULATIONS AND VARIOUS WATER MANAGEMENT DISTRICTS' RULES AND REGULATIONS. YOU ARE EITHER ALREADY DEALING WITH THEM, OR THEY DO NOT APPLY TO YOUR TYPE OF OPERATION. BEEF CATTLE OPERATIONS, NAMELY COW-CALF, PROBABLY ARE THE LEAST REGULATED TYPE OF AGRICULTURAL OPERATION AT THIS TIME. THE DEGREE OF REGULATION MAY DEPEND UPON WHERE YOUR OPERATION IS LOCATED. ENVIRONMENTAL RULES AND REGULATIONS ARE AN EVER-CHANGING PROCESS, KIND OF LIKE TAXES, ALWAYS INCREASING. AS TIME GOES ON, SO WILL THE MEDDLING OF THE BUREAUCRATS, TRYING TO SAVE OR PROTECT THE WORLD.

IT IS IN MY OPINION THAT A LOT OF THE RULES AND REGULATIONS, AND ESPECIALLY THE PERMITTING BEING FORCED UPON US NOW, ARE THE DIRECT RESULT OF PREDEVELOPMENT LANDCLEARING AND DRAINAGE BEING DONE UNDER THE EXEMPTION OF AGRICULTURE.

THE ENVIRONMENTAL PROTECTION AGENCY'S ENDANGERED SPECIES ACT

HAD IT BEEN INITIATED IN ITS ORIGINAL FORM, THIS ACT WOULD HAVE SET AGRICULTURE BACK FIFTY YEARS. THIS LITTLE ITEM RATTLED EVERYBODY'S CAGE. EVERY KNOWN AGRICULTURAL GROUP, ALONG WITH THE DIFFERENT STATES' DEPARTMENTS OF AGRICULTURE, GOT INVOLVED. I KNOW IT HAS COME A LONG WAY FROM WHERE IT WAS, AND HOPEFULLY IN THE END IT WILL BE SOMETHING WE CAN SURVIVE UNDER.

SURFACE WATER MANAGEMENT OR STORMWATER MANAGEMENT WE NO LONGER HAVE A DRAINAGE SYSTEM, WE HAVE A WATER MANAGEMENT SYSTEM. THE RULES AND REGULATIONS PROBABLY CHANGE HERE MORE OFTEN THAN IN ANY OTHER AREA. PERMIT REQUIREMENTS CAN CHANGE AND YOU CAN FIND YOURSELF IN VIOLATION, WHEN A YEAR BEFORE THE SAME TYPE OF PROJECT WAS EXEMPT. DO NOT TRY TO QUOTE ME IN COURT, BUT I UNDERSTAND MAINTENANCE OF EXISTING SYSTEMS IS ALLOWED UNDER STATE LAW. HOWEVER, SINCE MANY OR MOST OF THESE OLD SYSTEMS WERE PUT IN YEARS AGO WITHOUT ANY ENGINEERING AS TO SIZE OR DESIGN, THERE IS NO WAY TO PROVE THE ACTUAL ORIGINAL SIZE OF YOUR DITCH. I HAVE HEARD THAT SOME OF THE WATER MANAGEMENT DISTRICTS ARE USING THIS AS BASIS TO DISALLOW MAINTENANCE AND REQUIRE A PERMIT AS IF THE DITCH WAS NEVER THERE.

I WAS CAUGHT IN THIS TRAP LAST YEAR WHILE DOING MAINTENANCE ON MY DYKE. I WAS ABLE TO CONTINUE AFTER SHOWING THE WATER MANAGEMENT DISTRICT A PORTION OF THE DYKE THAT WAS MARL AND SHELL AND WAS CLOSE TO ORIGINAL SIZE THAT HAD NOT SUBSIDED LIKE THE MUCK DYKE. I WAS ADVISED TO GET AN ENGINEERING DESIGN AND FILE IT SO THAT IF IN THE FUTURE WE NEED TO DO ANY MORE WORK WE WILL HAVE IT.

I UNDERSTAND THE STORMWATER RULE IS TO COME BEFORE THE LEGISLATURE THIS YEAR AND WHO KNOWS WHAT WILL COME OUT OF IT, BUT I UNDERSTAND THERE WILL BE SOME MAJOR CHANGES.

STORAGE AND DISPOSAL OF HAZARDOUS MATERIALS

THIS IS AN AREA I FIND MORE AND MORE PEOPLE KNOW VERY LITTLE ABOUT. THE MAIN CONCERN FOR MOST OF US IS FUEL TANKS. THE DEPARTMENT OF ENVIRONMENTAL REGULATIONS IS REQUIRING ALL TANKS OF MORE THAN 500 GALLON CAPACITY BE REGISTERED. ANY FUEL DISTRIBUTOR FILLING NON-REGISTERED TANKS IS IN VIOLATION OF THE LAW. ONE DISTRIBUTOR HAS ALREADY BEEN FINED \$3,000 FOR FILLING A NON-REGISTERED TANK. ANOTHER THING I WAS TOLD BY DEPARTMENT OF ENVIRONMENTAL REGULATION IS THAT THEY REQUIRE TWO YEARS BACK RECORDS FOR FUEL INVENTORY.

IF YOU HAVE A LEAK AND DON'T REPORT IT, I AM NOT CLEAR AS TO HOW THEY WOULD FIND OUT ABOUT IT, BUT I UNDERSTAND IT COULD COST INTO THE HUNDREDS OF THOUSANDS DOLLARS TO REMOVE AND REPLACE CONTAMINATED SOIL. I DO NOT HAVE ANY IDEA WHAT ALL WOULD BE INVOLVED WITH THE GROUNDWATER.

ORDINARY HIGH WATER LINE

OUR RIGHT TO PRIVATE OWNERSHIP IS ON VERY SHAKY GROUND WHEN A GOVERNMENTAL AGENCY CAN COME IN AND TAKE LAND FROM YOU THAT HAS BEEN IN YOUR FAMILY FOR OVER A CENTURY, (LAND THAT YOU HOLD TITLE TO AND PAY TAXES ON) AND SAY YOU NEVER OWNED IT BECAUSE THE STATE NEVER HAD THE RIGHT TO SELL THIS LAND IN THE FIRST PLACE. HOPEFULLY, THIS WILL BE RESOLVED IN THIS LEGISLATIVE SESSION.

ENVIRONMENTAL AUDITS

ANYTIME A LENDING INSTITUTION IS INVOLVED WITH A PIECE OF PROPERTY, THE POSSIBILITY OF OWNERSHIP IS EVIDENT THROUGH FORECLOSURE. THEREFORE, IF A HAZARDOUS MATERIAL IS FOUND ON SITE, THE BANK IS RESPONSIBLE FOR THE CLEAN-UP WHICH CAN EXCEED THE VALUE OF THE PROPERTY. EVEN IF YOU ARE ONLY BORROWING

**OPERATING CAPITAL, IF AN AUDIT IS REQUIRED, IT WILL BE AT THE BORROWER'S EXPENSE.
THE COMPREHENSIVE PLAN**

OUR VALUE HAS BEGUN TO SURFACE. A COUPLE OF YEARS AGO THE TERM AG LAND PRESERVATION CAME ABOUT. WE HAVE DEFEATED THE TERMINOLOGY, BUT NOT THE THEORY.

OPEN SPACE HAS BECOME A VERY DESIRABLE ASSET TO OUR LOCAL PLANNERS. IT PROVIDES SUCH THINGS AS HABITAT PROTECTION FOR ENDANGERED SPECIES, ENVIRONMENTAL RESOURCES, RECREATION, LARGE TAX BASE, SCENIC VISTAS, AQUIFER RECHARGE AND MANY OTHERS. AS LONG AS YOU STAY IN A COW-CALF OPERATION, OR SOME OTHER LOW INTENSITY FORM OF PRODUCTION, YOU ARE PROBABLY OKAY... JUST DO NOT TRY TO GET OUT.

THE GROWTH MANAGEMENT ACT OF 1985 HAS MANDATED EVERY COUNTY AND MUNICIPALITY, LARGE AND SMALL, TO PRESENT A GROWTH MANAGEMENT PLAN. THIS IS PROBABLY THE TAPROOT FROM WHICH MOST OF OUR FUTURE PROBLEMS WILL GROW, AND WILL PROBABLY FURTHER ERODE PROPERTY RIGHTS.

IN THE STATE'S PLAN, AND IN MOST REGIONAL PLANS, AGRICULTURAL PRACTICES ARE EXEMPT OR REQUIRED TO USE SOIL CONSERVATION SERVICE'S BEST MANAGEMENT PRACTICES. THE COUNTY PLAN IS THE ONE TO WATCH CAREFULLY.

THE LANDCLEARING AND LANDSCAPE ORDINANCES ON THE LOCAL LEVEL COULD BE SO STRICT AS TO REQUIRE A PERMIT, OR EVEN DISALLOW THE MOWING OR CHOPPING OF PASTURES, LET ALONE THE CLEARING AND PLANTING OF NEW PASTURES. AQUIFER PROTECTION CAN RESTRICT OR ELIMINATE PRODUCTION IN DESIGNATED RECHARGE AREAS, WHETHER THEY FUNCTION AS RECHARGE OR NOT. IT WILL BE AT YOUR EXPENSE TO PROVE DIFFERENTLY.

WETLANDS PROTECTION ORDINANCES IN THE PLAN CAN BE MORE RESTRICTIVE THAN ON THE STATE OR DISTRICT LEVELS. LITTLE ITEMS LIKE ENDANGERED SPECIES PROTECTION; WHETHER IT BE PLANT OR ANIMAL, WILDLIFE CORRIDORS, HABITAT PROTECTION AND

NOW EVEN UPLAND PROTECTION CAN RESTRICT WHAT YOU DO IN YOUR NORMAL DAY-TO-DAY OPERATIONS. IT WOULD TAKE A 300 PAGE BOOK TO WARN YOU OF ALL THAT CAN HAPPEN. CONTACT AND MEET WITH YOUR COUNTY COMMISSIONERS AND COUNTY PLANNERS. PROVE TO THEM YOU ARE NOT DESTROYING EVERYTHING AND YOU ARE NOT JUST WAITING FOR A BIG DEVELOPMENT OFFER ON YOUR LAND. BUT YOU MUST ALSO BE CAREFUL NOT TO ALLOW THEM TO LOCK YOU INTO AGRICULTURE. THIS CAN DESTROY YOUR PROPERTY VALUE AND YOUR BORROWING POWER. REMIND THEM OF YOUR VALUE TO THE COUNTY AS OPEN SPACE, AND ABOVE ALL, YOU MUST REMAIN FLEXIBLE TO EXIST. THE MAIN THING YOU NEED TO EMPHASIZE TO THEM IS THAT AGRICULTURE CANNOT CONTINUE TO OPERATE UNDER THE SAME REGULATIONS AS DEVELOPERS, AND CANNOT AFFORD TO GET A PERMIT FOR YOUR EVERYDAY OPERATIONS BECAUSE YOU DO NOT HAVE THE REQUIRED TIME, AND CANNOT PASS ON THE INCREASED COSTS.

IN CLOSING, I WILL AGAIN SAY, GET INVOLVED! IF YOU ARE NOT A MEMBER OF FLORIDA CATTLEMEN'S ASSOCIATION AND THE NATIONAL CATTLEMEN'S ASSOCIATION, I URGE YOU TO JOIN. AGRICULTURE IN THE PAST HAS BEEN PICKED ON BECAUSE WE WERE UNORGANIZED. THIS IS NOT NEARLY AS TRUE AS IT ONCE WAS. THE F.C.A. WAS INSTRUMENTAL IN HOLDING AN ENVIRONMENTAL SEMINAR IN 1988, FROM WHICH WE HAVE GAINED A LOT OF RESPECT AND SUPPORT. THE NATIONAL CATTLEMEN'S ASSOCIATION HAS A FULL-TIME STAFF IN WASHINGTON, D.C., LOBBYING OUR INTERESTS ON THE NATIONAL AND INTERNATIONAL LEVELS. IN TALLAHASSEE, THE F.C.A. HAS PAT MCCAFFREY LOBBYING OUR INTEREST AND HELPING PROTECT US FROM AN URBAN LEGISLATURE THAT JUST DOES NOT UNDERSTAND OUR PROBLEMS. I REALIZE SOME COUNTY OFFICIALS ARE ALSO OF AN URBAN NATURE AND HAVE TURNED A DEAF EAR TO AGRICULTURE. THIS JUST MEANS THAT ON THE LOCAL LEVEL YOUR JOB IS GOING TO BE A LITTLE TOUGHER. I AGAIN STRONGLY URGE YOU... GET INVOLVED AND BE INFORMED.



NEW PRODUCTS SUCCESSSES AND FAILURES

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Consumers are demanding quality and variety in the meals they eat, coupled with quick and easy preparation. The main factors, other than price, which influence consumers' decisions for food purchases include health consciousness, taste and convenience. Meat has a proven record for providing the taste and satisfaction consumers desire. Meals have traditionally been planned around meat. In recent years, however, the demand for meat products has declined because of health implications and convenience factors. New products are made using meat as an ingredient rather than a separate entree. To address these concerns and to maintain its market share, new ways of presenting meat products must be developed.

The most popular ways in which new products are introduced to the market place are changes in size, shape or

packaging of existing products. Products that historically have had high demand may be declining simply because that segment of the population which buys the product is becoming smaller. Many of the changes in packaging attempt to capture the interest of other segments of the population, such as convenience-minded consumers, in hopes of reestablishing demand. Other methods of new product presentation are the result of a reduction in fat and salt content which are introduced to attract the attention of health-conscious individuals. Inasmuch as these changes in product presentation fulfill consumer desires for meat products, sensory characteristics are still the ultimate criteria for sustained acceptance. Although consumers are beginning to pay a slightly higher price to obtain convenience and perceived health benefits, they rarely give up taste. People eat food, not nutrition. If the new low fat, low salt product does not mimic the flavor and texture of the established product, consumer acceptance may be minimized.

Current areas of research are targeted toward reductions in fat and salt, two of the constituents of meat and meat products indicted for contributing to health problems. Each of these constituents provide many functions to the meat product, and a reduction in fat and salt change the

characteristics of the product. Fat provides several functions. Flavor, juiciness and a satiety factor are partially dependent on fat content. Given selections of ground beef, consumers will select ground beef with the lowest fat content at the retail case, but will indicate a preference toward the ground beef with a higher fat content during taste evaluations.

These same preferences are also true for processed products, although texture is the primary characteristic that is affected by a reduction in fat content. A more rubbery, less tender product is obtained with lower fat content. To alleviate these textural changes with fat reductions, the USDA has allowed for an increase in the addition of water such that the amount of fat and water in the final product does not exceed 40%. These products have not yet gained wide acceptance due to perception by consumers. Unless steps are taken to correct the problem, the increase in moisture can also cause decreased shelf life. More research is required to reduce fat content and maintain flavor and textural properties.

Salt content can be reduced as much as 25% without excessive changes in textural properties. Salt is added to processed meat products for flavor, increased protein functionality and microbial stability. The taste for salt is acquired indicating that reductions in salt can be accepted if overall consumption of salt by the consumer is reduced. However, the textural properties and stability of the product must be addressed to maintain product characteristics for complete acceptance.

The reduction or replacement of sodium has met with some success in processed meat products. Other chloride salts such as calcium chloride, magnesium chloride or potassium chloride have been examined with potassium chloride showing the best potential. Partial replacement of sodium chloride can be achieved with the incorporation of potassium chloride. Flavor problems relating to the bitterness of potassium chloride can arise if greater than 50% of the sodium chloride is replaced.

The utilization of microwave ovens for meal preparations has increased at a phenomenal pace. The penetration of microwaves into homes has reached 75% and projections are that 90% of all households will contain at least one microwave by 1990. Some predictions suggest that even automobiles will have microwaves as optional equipment for meals on the go. Microwaveable was easily the most utilized label declaration in the last decade.

Lack of consumer acceptance for meat products cooked in a microwave has led to the utilization of microwaves for reheating prepared foods. Uneven heating, reduced browning and flavor differences contribute to poor acceptance of microwave-cooked products. Companies are no longer content with adapting existing products for microwave cooking. Products are beginning to be designed specifically for microwaves, whether it be changes in packaging or changes within product formulation. Cylindrical shaped products, for example, reduce the number of sharp edges and therefore reduce the uneven heating pattern. Browning of the

product may be addressed by changes in packaging and the use of susceptors that collect microwave energy and concentrate the heat produced at the surface. It is also important to understand how composition varies the heating profile of different meat products. If these drawbacks are addressed, the opportunity to develop products that can be fully cooked by microwave technology is possible.

Research efforts studying the effect of microwave cooking on beef roasts is in its infancy. Here at the University of Florida, a study by Yates et al. (1988) compared reformed beef roasts cooked in a microwave to those cooked in a conventional oven. A post-cooking temperature rise of 20° - 40°F was found to occur in roasts cooked in a microwave. If this temperature rise was accounted for by turning off the microwave prior to the desired end point temperature, trained sensory panelists did not detect a difference in the roasts cooked in a microwave compared to roasts cooked in a conventional oven. Therefore, successful acceptance of microwaveable beef roasts requires educating the consumer on methods to cook by microwave technology. Future work should involve the identification of the effect of product composition on cooking characteristics of beef roasts.

Product development is the key for preserving demand. The success rate for new products, however, is very low. Conservative estimates for the success rate of products from the time of conception to the introduction on retail shelves is less than 10%. In spite of this low success rate, the number of new products on retail shelves was up 45% in 1988 compared to 1987. Companies are continuing to upgrade products to meet changing consumer demands and maintain their market share.

The underlying impetus for product development is the identification of a problem. A problem facing the meat industry today is to provide a diversified group of consumers with products that fit their lifestyle and still provide taste and satisfaction. Consumers tend not to be consistent with respect to perceptions of healthful foods. Many people who are health conscious will give up eating well marbled steak but will continue to eat premium ice cream and cheese cake. This discontinuity in consumer reactions to health claims is difficult to perceive. Products introduced as the result of an accurate expectation of change or created to make a change will have a better chance of succeeding at the retail level.

The key to a new product's success lies in knowing the product, market, price structure, and retail strategies. An in-depth market study to determine the acceptability of a new product is advised before extensive time and labor are expended in the development of a product. The cost of introducing the product into the wrong market is 20 times greater than obtaining the knowledge of the market into which the product should be introduced.

The size of the company has a great impact on the ability to introduce a product into the market. Small companies have local clientele and relatively small distribution areas. Small production sizes and equipment inventories allow for

flexibility in introducing a new product. Small quantities of the product can be produced and test marketed in the immediate area to determine the success of the product before full scale production begins.

Medium-sized companies have the most difficulty in producing a new product. Medium-sized companies do not have the financial backing to develop untested products like the larger companies and lack the flexibility to produce the product like the smaller companies. Many of these companies are restricted to the introduction of "me-too" products and market products that have been developed and test marketed by larger companies and found successful.

Larger companies have the financial banking for new product development and are more able to absorb the 9 out of 10 failures. In-house research and development labs and the financial backing to perform the proper test marketing help to make a successful product. The failures of products lie within the structure of the firm. Research and development personnel are anxious to examine the

production of a new product at full scale. Line supervisors, however, are struggling to make quotas and additional production is not looked upon favorably. Miscommunication between developers and marketing personnel can also lead to misrepresentation of the product.

The future of product development lies within the cooperative actions of all segments of the industry. Monitoring consumer changes in attitude toward meat in hopes of anticipating change can lead to greater success. There are products that as yet have not been developed. These products will provide the versatility, convenience and flavor that will keep meat in demand.

ENVIRONMENTAL ISSUES OF CONCERN TO FLORIDA CATTLEMEN

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THE FOLLOWING FACT SHEET IS AN EXAMPLE OF PROPOSED REGULATION CHANGES THAT WILL IMPACT FLORIDA CATTLEMEN.

PROPOSED WORKER PROTECTION STANDARDS (PART 170)

AGENCY ACTION

THE ENVIRONMENTAL PROTECTION AGENCY (EPA) IS PROPOSING REVISIONS TO ITS "WORKER PROTECTION STANDARDS FOR AGRICULTURAL PESTICIDES" (40 CFR PART 170). THESE REVISIONS WILL EXPAND THE SCOPE OF THE WORKER PROTECTION STANDARDS TO INCLUDE WORKERS IN NURSERIES, FORESTS, AND GREENHOUSES, IN ADDITION TO PERSONS ON FARMS WHO MAY BE EXPOSED TO PESTICIDES OR PESTICIDE RESIDUES, INCLUDING PESTICIDE MIXERS, LOADERS, APPLICATORS, FLAGGERS, AND THOSE WHO CLEAN AND REPAIR CONTAMINATED APPLICATION EQUIPMENT. PESTICIDES USED IN AND AROUND HABITATIONS, ON FAMILY FARMS, FOR CERTAIN PESTICIDE RESEARCH, AND IN POSTHARVEST OR INCIDENTAL APPLICATIONS, ARE NOT COVERED BY THE REGULATION.

THIS PROPOSAL CONTAINS BOTH REVISIONS AND ADDITIONS TO CURRENT REQUIREMENTS TO PROTECT WORKERS FROM UNREASONABLE ADVERSE EFFECTS OF PESTICIDE EXPOSURE. THE REVISIONS WILL: SPECIFY GENERIC INTERIM REENTRY INTERVALS; REQUIRE PERSONAL PROTECTIVE EQUIPMENT FOR PESTICIDE HANDLERS AND EARLY REENTRY WORKERS; AND EXPAND METHODS TO NOTIFY WORKERS OF AREAS THAT HAVE BEEN TREATED WITH PESTICIDES (ORAL WARNINGS, INFORMATION AVAILABLE ON REQUEST, AND FIELD POSTING). REENTRY INTERVALS AND REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT ARE BASED ON THE ACUTE TOXICITY CATEGORY OF THE FORMULATED PRODUCT OR ACTIVE INGREDIENT, ROUTE OF EXPOSURE, AND METHODS OF APPLICATION. THEY MAY BE REBUTTED BY REGISTRANTS AND OTHERS BY SUBMISSION OF APPROPRIATE DATA.

NEW REQUIREMENTS INCLUDE DUTIES RELATED TO: WEARING AND CLEANING OF PERSONAL PROTECTIVE EQUIPMENT; TRAINING OF HANDLERS; PROVIDING INFORMATION AND TRANSPORTATION IN CASE OF MEDICAL EMERGENCIES; MAINTAINING CONTACT WITH HANDLERS OF HIGHLY TOXIC PESTICIDES WORKING ALONE; MONITORING OF CHOLINESTERASE LEVELS FOR COMMERCIAL PESTICIDE HANDLERS; PROVIDING WATER FOR ROUTINE AND EMERGENCY DECONTAMINATION WATER; AND PROVIDING PESTICIDE SAFETY INFORMATION TO WORKERS.

THE PROPOSED REVISIONS ALSO IDENTIFY THOSE RESPONSIBLE FOR CARRYING OUT THE REGULATIONS, INCLUDING OWNERS, SUPERVISORS, WORKERS, COMMERCIAL APPLICATORS, LABOR CONTRACTORS, AND OTHER CONTRACTORS. STATES ARE AUTHORIZED TO IMPOSE MORE STRINGENT WATER PROTECTION REQUIREMENTS AND MAY, AT THEIR OPTION, PLAY A ROLE IN IMPLEMENTING TRAINING AND CHOLINESTERASE MONITORING REQUIREMENTS. THE PROPOSAL SPECIFIES INFORMATION THAT MUST APPEAR ON LABELS OF

ALL PESTICIDE PRODUCTS SUBJECT TO PART 170, WHICH WILL APPEAR ON LABELS OF ALL PESTICIDE PRODUCTS SUBJECT TO PART 170, WHICH WILL APPEAR IN "LABELING REQUIREMENTS FOR PESTICIDES AND DEVICES" (40 CFR PART 156) WHEN THAT PART IS PUBLISHED AS A FINAL RULE.

BACKGROUND

IN 1974, EPA PROMULGATED PART 170 UTILIZING ITS AUTHORITY UNDER FIFRA. EPA'S ROLE IN PROTECTING WORKERS FROM PESTICIDE EXPOSURE HAS BEEN UPHELD AND REAFFIRMED IN SUBSEQUENT COURT DECISIONS. THE CURRENT PART 170 APPLIES ONLY TO WORKERS PERFORMING HAND LABOR OPERATIONS IN FIELDS, SPECIFICALLY EXCLUDING GREENHOUSE AND SOIL-INCORPORATED USES. IT LIMITS RESPONSIBILITY TO OWNERS AND LESSEES AND CONTAINS FOUR REQUIREMENTS: A PROHIBITION AGAINST SPRAYING WORKERS; SPECIFIC REENTRY INTERVALS FOR 12 PESTICIDES AND A GENERAL MINIMUM REENTRY INTERVAL FOR ALL OTHERS; MINIMUM PROTECTIVE CLOTHING FOR WORKERS ENTERING TREATED AREAS BEFORE THE EXPIRATION OF THE REENTRY INTERVAL; AND A REQUIREMENT FOR "APPROPRIATE AND TIMELY" WARNINGS TO WORKERS.

IN 1983, EPA ISSUED PR NOTICE 83-2 (PART OF ITS LABEL IMPROVEMENT PROGRAM), REQUIRING THAT CERTAIN INFORMATION BE PLACED ON LABELS OF "ALL OUTDOOR AGRICULTURAL USE PRODUCTS WHICH ARE APPLIED TO CROPS WHOSE CULTURE REQUIRES HAND LABOR." SEVEN TYPES OF STATEMENTS WERE REQUIRED TO APPEAR ON THE LABELING OF THESE PRODUCTS. IN EFFECT, PR 83-2 IMPLEMENTED PART 170, THROUGH PESTICIDE PRODUCT LABELS.

ALSO, IN 1983 EPA CONDUCTED A REVIEW OF PART 170, AND CONCLUDED THAT IT WAS INADEQUATE TO PROTECT WORKERS OCCUPATIONALLY EXPOSED TO PESTICIDES AND THEIR RESIDUES. TO CORRECT THESE PROBLEMS, EPA PUBLISHED AN ADVANCE NOTICE OF PROPOSED RULEMAKING TO REVISE PART 170 IN 1984. MOST WHO PROVIDED COMMENTS AGREED THAT REVISIONS TO PART 170 WERE APPROPRIATE; HOWEVER THERE WAS NO CONSENSUS ON THE FORM AND CONTENT OF REVISION.

REGULATORY NEGOTIATIONS TO REVISE PART 170 WERE INITIATED IN 1985. A NEGOTIATING COMMITTEE OF 25 MEMBERS, INCLUDING REPRESENTATIVES OF INDUSTRY, USER GROUPS, FARMWORKERS, STATE OFFICIALS, AND FEDERAL AGENCIES, WAS CONSTITUTED UNDER THE FEDERAL ADVISORY COMMITTEE ACT. THE COMMITTEE MET SEVERAL TIMES IN PLENARY SESSION AND IN WORKING SUBGROUPS TO DISCUSS WORKING DRAFTS OF THE REVISIONS.

IN FEBRUARY 1986 SOME REPRESENTATIVES WITHDREW FROM PARTICIPATION IN THE NEGOTIATIONS AND A COMMITTEE CONSENSUS WAS NOT REACHED. EPA CONTINUED THE REGULATORY DEVELOPMENT EFFORT UNDER TRADITIONAL RULEMAKING AND AS A RESULT, IS PROPOSING THESE REVISIONS TO 40 CFR PART 170.

COMPARISON OF PRESENT PART 170 AND PROPOSED REVISIONS

| MAJOR PROVISIONS | PRESENT PART 170 | PROPOSED REVISIONS |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCOPE | <input type="radio"/> COVERS WORKERS PERFORMING HAND LABOR OPERATIONS IN FIELDS | <input type="radio"/> COVERS PESTICIDE HANDLERS AND WORKERS ENGAGED IN ANY AGRICULTURAL TASKS ON OR IN FARMS, FORESTS, NURSERIES, AND GREENHOUSES |
| | <input type="radio"/> EXCLUSIONS: SOIL INCORPORATION, GREENHOUSES, PUBLIC PEST CONTROL, ANIMAL TREATMENTS, GOLF COURSES | <input type="radio"/> EXCLUSIONS: PUBLIC PEST CONTROL, ANIMAL TREATMENTS, GOLF COURSES, DOMESTIC SITES, INJECTION, RIGHTS-OF-WAY, POST-HARVEST, AND CERTAIN RESEARCH USES |
| RESPONSIBILITY | <input type="radio"/> OWNERS AND LESSEES HAVE DUTIES | <input type="radio"/> OWNERS (PERSONS WITH PRESENT POSSESSORY INTEREST), SUPERVISORS, WORKERS, LABOR CONTRACTORS, AND APPLICATION CONTRACTORS HAVE DUTIES |
| | | <input type="radio"/> OWNER'S RESPONSIBILITY LIMITED IF WORKER FAILS TO OBEY INSTRUCTIONS OR IF VIOLATION HAPPENS OFF THE PROPERTY |
| REENTRY | <input type="radio"/> REENTRY NOT PERMITTED DURING REENTRY INTERVAL UNLESS PROTECTIVE CLOTHING WORN | <input type="radio"/> REENTRY NOT PERMITTED DURING REENTRY INTERVAL UNLESS 1) NO CONTACT WITH TREATED SURFACES OR 2) PROTECTIVE CLOTHING WORN, HANDLER TRAINING PROVIDED, AND HANDLER DECONTAMINATION WATER PROVIDED |
| | <input type="radio"/> MINIMUM INTERVAL FOR ALL PESTICIDES: UNTIL SPRAYS DRY AND DUSTS SETTLE | <input type="radio"/> MINIMUM INTERVAL FOR ALL PESTICIDES: UNTIL SPRAYS DRY, DUSTS SETTLE AND VAPORS DISPERSE |
| | <input type="radio"/> SPECIFIC INTERVALS FOR 12 PESTICIDES OF EITHER 24 OR 48 HOURS | <input type="radio"/> SPECIFIC INTERVALS (BASED ON ACUTE TOXICITY OF ACTIVE INGREDIENT, RE-BUTTABLE BY PART 158 REENTRY DATA): 48 HOURS FOR TOX 1 OP'S AND CARBAMATES, 24 HOURS FOR OTHER TOX 1 AND FOR TOX 2 OP'S AND CARBAMATES |
| | <input type="radio"/> NO REENTRY IF SPECIAL CIRCUMSTANCES INDICATE A HAZARD | <input type="radio"/> SPECIAL RESTRICTIONS FOR GREENHOUSE REENTRY (E.G. FUMIGANTS) |
| PERSONAL PROTECTIVE EQUIPMENT | <input type="radio"/> PROTECTIVE CLOTHING DEFINED AS HAT, LONG-SLEEVED SHIRT, LONG-LEGGED PANTS, SHOES AND SOCKS | <input type="radio"/> ITEMS OF PERSON PROTECTIVE EQUIPMENT SPECIFIED ACCORDING TO 1) TYPE OF ACTIVITY (MIXING/LOADING, APPLICATION, EARLY REENTRY ETC), 2) ROUTE OF EXPOSURE, 3) SUBSTANCE EXPOSED TO (ACTIVE OR FORMULATED), AND 4) TOXICITY CATEGORY |
| | <input type="radio"/> NO REENTRY ALLOWED WITHOUT PROTECTIVE CLOTHING AS DEFINED | <input type="radio"/> MODIFICATION ALLOWED BASED ON DATA SUBMISSION AND ANTICIPATED EXPOSURE SCENARIO |
| | | <input type="radio"/> DUTIES RELATED TO USE AND MAINTENANCE OF EQUIPMENT ARE SPECIFIED |

| | | |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NOTIFICATION | <input type="radio"/> WARNINGS FOR ALL WORKERS EXPECTED TO BE WORKING IN FIELDS TREATED OR TO BE TREATED <input type="radio"/> WARNINGS MAY BE GIVEN ORALLY, BY FIELD POSTING, OR BY CENTRAL BULLETIN BOARD NOTICE | <input type="radio"/> NOTIFICATION FOR ALL WORKERS WHO WILL BE WORKING IN OR NEAR A TREATED AREA <input type="radio"/> NOTIFICATION METHOD VARIES BY SITE: FARMS AND FORESTS -- POSTING FOR APPLICATIONS WITH > 48 HOUR INTERVAL, ORAL WARNINGS FOR ALL APPLICATIONS; NURSERIES AND GREENHOUSES -- POSTING OF ALL TREATED AREAS, NO ORAL WARNINGS <input type="radio"/> ADDITIONAL PESTICIDE-SPECIFIC INFORMATION AVAILABLE UPON REQUEST |
| <hr/> | | |
| DECONTAMINATION | <input type="radio"/> NOT REQUIRED | <input type="radio"/> POTABLE WATER, SOAP, AND DISPOSABLE TOWELS MUST BE PROVIDED DURING HANDLING TASKS AND REENTRY ACTIVITIES. <input type="radio"/> EYE WASH DISPENSER REQUIRED DURING EXPOSURE TO PESTICIDES WITH TOX 1 OR 2 EYE IRRITATION |
| <hr/> | | |
| TRAINING | <input type="radio"/> NOT REQUIRED | <input type="radio"/> HANDLERS AND EARLY REENTRY WORKERS: TRAINING IN PESTICIDE USE AND SAFETY, GIVEN BY CERTIFIED APPLICATOR OR TRAINER OF CERTIFIED APPLICATORS, STATES MAY PETITION EPA TO MODIFY TRAINING REQUIREMENTS <input type="radio"/> PESTICIDE SAFETY INFORMATION POSTED |
| <hr/> | | |
| OTHER | <input type="radio"/> NOT REQUIRED <input type="radio"/> NOT REQUIRED <input type="radio"/> NOT REQUIRED <input type="radio"/> NOT REQUIRED | <input type="radio"/> CHOLINESTERASE MONITORING OF COMMERCIAL HANDLERS REQUIRED IF EXPOSURE TO TOX 1 OR ORGANOPHOSPHATE PESTICIDES ON 3 CONSECUTIVE DAYS OR 6 OUT OF 21 DAYS <input type="radio"/> RECORD-KEEPING BY COMMERCIAL HANDLER EMPLOYERS <input type="radio"/> STATES MAY MODIFY MONITORING REQUIREMENTS <input type="radio"/> HANDLERS MUST HAVE ACCESS TO PESTICIDE LABELING <input type="radio"/> EMERGENCY DUTIES: PROVIDE TRANSPORTATION, MEDICAL ASSISTANCE AND APPLICATION INFORMATION TO WORKERS SUSPECTING POISONING <input type="radio"/> HANDLERS OF HIGHLY TOXIC PESTICIDES MUST MAKE VISUAL OR VOICE CONTACT EVERY 2 HOURS WITH ANOTHER PERSON |
| <hr/> | | |

CHALLENGES AND OPPORTUNITIES IN THE NINETIES

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The decade of the nineties will be a watershed time in the U.S. beef cattle industry. The challenges to the industry are no longer as deeply involved in defending the image of beef in the eyes of the consumer, but rather to develop the production and marketing efficiency which will allow beef producers to compete with pork, chicken and fish at the retail counter. The challenge will be to not allow beef to be positioned as a luxury like lobster. I really don't want to be in the position of bragging about how the product is selling for

\$10 per pound but knowing at the same time the average per capita consumption has been cut in half. This a formula for obscurity. We must continue to seek out those production practices that make our operations more efficient, and work to develop a marketing system based on real value rather than perceived value.

We have been through a period of time when the emphasis was on "more". We had a mind set in our industry to produce more lbs., more height and more gross return, and many went broke trying to accomplish these goals. The nineties will be a decade when the emphasis will be on resource management to maximize net returns.

The challenges that will impact Florida producers most directly will be those dealing with the environment. Maintaining cattle operations in a state with a large human population will become increasingly difficult. Regulations of

the operations that drain toward Okeechobee are being talked about at this time. These types of regulatory efforts will intensify during the nineties. Cattlemen must make a substantial investment in research so that they do not become victims to some unproven theory. They must also invest in lobbying efforts to carry the true facts of the situation to the legislative and regulatory people in state government. These kinds of costs will have to be recognized as part of the cost of doing business in the nineties.

An even more difficult challenge for the nineties will be the area of animal rights and animal welfare. The two subjects are different and must be considered separately. Animal rights is a concept under which animals are given the same considerations as to their physical and mental well-being as humans. The groups which back these issues are not slowed down by scientific fact or logic. Their driving force is emotion and their agenda includes ending red meat consumption in the U.S. diet. The cattle industry's defense lies in informing the rest of the population about our industry and how we handle animals so as not to be "shouted down" when legislation is introduced affecting animal care.

Animal welfare activists are concerned that animals are treated well and not abused or unnecessarily stressed

during their lives. These groups will respond to research data and logic. Cattlemen have the challenge of developing data and means of communication with these groups to tell our side of the story. Cattlemen must also face up to the fact that if there are operators who routinely abuse animals in their operations we will have to educate them to change their practices or face regulation.

Each of the challenges that I have discussed brings with it opportunities for the innovative producer. As value-based marketing becomes a reality, the innovative producer will receive an increasingly large premium for his production over the average to poor producer. If we simply don't respond to the challenge, there will be small profit incentive for the truly top producers. In the areas of the environment and animal rights/animal welfare, the cattle producer has the opportunity to create a bond with the average consumer through informational and legislative programs showing both the necessity for animal production and the positive aspects of beef cattle producers.

The decade of the nineties will at times be frustrating, environmentally centered, characterized by debate, ruled by legislation and if we do our homework and cooperate, profitable.

**EXPERIENCES WITH SEED PRODUCTION
FROM FLORIDA FORAGES**

Kelsey Payne
C.M. Payne & Son
Sebring, Florida

Most operations like ours are family run companies. In our business, we operate a share-harvest program. Usually, seed is harvested on a 50/50 share basis, with the seed company providing all harvesting, hauling, drying and processing. It also provides for the storage and sale of the product. Seed production offers an opportunity for anyone

with a little acreage to either provide themselves with more income for their operation, or to cut costs by creating a source of seed for future improvements.

Legume seed production has been something I have been interested in for many years. C.M. Payne & Son has worked with the extension service, various experiment stations (IFAS), and others, regarding the seed varieties of *Aeschynomene americana*, Common hairy indigo, *Desmodium heterocarpon* and Phasey bean. Our purpose is to try and find legumes that will grow in Florida, and that will provide forage for livestock and wildlife. Most of you know about *Aeschynomene*, and many of you may have tried it or have it in your present program. Those of you who are still using it, know that *Aeschynomene* is our best all-around legume. It has a long season of productive growth in late summer and fall, which provides additional protein at a time when our grasses lose their nutritional value. We also know that *Aeschynomene* needs to be shook up every so often to revitalize the stand. We can do this by burning or renovating in the Spring on a regular basis. Grazing this crop prior to seed production is possible; however, be aware that you must pull the cattle in September so that a full bloom and resultant seed crop are possible. Commercial seed production is feasible under many different management schemes.

Indigo, alyceclover and the other legumes that have been around for a long time will fill certain needs: Indigo will grow on higher and dryer soil, alyceclover will make excellent high quality hay, and in certain special cases, you may be able to get *Desmodium heterocarpon* to perform very well. Crops like Japanese millet, may only pay for renovation costs after sodding operations. In addition, many of these legumes will enhance your soil with organic nitrogen. In the majority of cases, we find that the value of your seed crop will fertilize two acres for each acre harvested.

New crops or variations of existing crops appear from time to time, and we try most of them. However, I think that when you try them, plant one or maybe two at a time to test new forages on your place. Locate your test block in an area you can control, and use a relatively small amount of acreage at first. Observe the test block for two

to three years before you commit to any full-scale involvement with any particular variety. Study the information published by IFAS carefully; it could save a lot of time and trouble.

Seed production and seed costs are reflected by production quantities and the demand of the particular product in question. If a particular seed becomes desirable, for whatever reason, demand pushes the price of that variety up. In most cases, increased production results, and prices will come down. As I have mentioned earlier, you can insulate yourself from this by starting a seed production program, producing those varieties that are useful to you and maybe generate extra revenue by selling your surplus.

BEEF HEALTH MANAGEMENT PROSPECTS FOR THE 1990'S

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INTRODUCTION

As the beef industry moves into the last decade of this century, producer optimism is good, as cattle prices have been up and steady the last several years. The challenges and problems of this coming decade also loom before us. Cattle numbers are tending down, a response to several years of poor cattle prices and probably more importantly, reduced consumer demand (confidence) in our product. Concerns over the healthfulness of red meat, drug residues, hormones and so forth have hurt the market. Further, issues of land ownership, water rights, environmental protection, animal well being (welfare/rights) have impacted the producer's ability to independently go about his way of life as he previously has.

The cow-calf producer's business continues to become more complex and more demanding. Greater expertise is required in more areas. The new decade will be more demanding. The producer will feel increased economic pressure to have a well managed business enterprise to compete in the market place and to stay economically viable. He or she will feel greater production pressure to increase the number of calves weaned, optimize the weight at which they wean, and minimize costs per cow maintained. The title presupposes some vision of the future. I may, more likely, express some arm-chair philosophy or evoke shades of Buck Roger's, but all in all, I hope you will feel optimistic about the prospects ahead.

DELIVERY OF HEALTH MANAGEMENT SERVICES AND INFORMATION

The veterinarian will continue to be the producer's front line resource for health management services and information. The veterinary profession, like the beef industry, faces many changes and adjustments in the coming decade. The veterinary education in the United States has endeavored to produce a practitioner with a broad general knowledge of medicine and surgery. The specialization and focusing of that knowledge and skill has been limited.

The profession, as a whole, is becoming more aware of the need to change the curriculum and training of veterinarians. Part of this process comes as those of us associated with the beef industry ask ourselves some hard

questions and search for answers which will produce a better beef-production oriented veterinarian.

How can we best serve the beef producer? Traditional delivery of services has included: 1) care of the sick cow or calf, eg. the one that's off-feed, the downer, lame or has an abscess; 2) emergency intervention, eg. the bloat, ingestion of toxic agents, acute epidemic disease, abortions and calving difficulties; 3) elective procedures, eg. castration, dehorning, de-worming and vaccination; and 4) regulatory procedures, eg. health inspection, testing and vaccination. Fire-engine medicine and surgery!

Can the veterinarian offer a service which will help the producer better meet his needs, pressures and goals? Can we do it at a price that is bearable or preferably cost effective and income producing for the producer and veterinarian? Can we accomplish these things by offering the traditional veterinary services alone? I think not. What type of service are we going to see then?

Key: One with a more purposeful involvement in health and production management, not just an occasional fix-up or patch-up.

Aim: Help the beef producer optimize his profit!

This will require a change in philosophy and education. The beef practitioner will be better trained to meet the needs of the producer. This will include not only surgery and medicine, but also, health management, production, nutrition, environmental engineering, economics, marketing, statistics, computer literacy and epidemiology. Furthermore and more importantly, they will be challenged toward the development of sound problem solving skills, and client interaction skills.

Integrated production medicine, herd health management, preventive veterinary medicine, production medicine, integrated resource management are names for a concept which has been in the development stages for a number of years. The concept comes to life when a functional team is established. This may be as simple as the producer and veterinarian, or it may be more comprehensive, including animal scientists with a wide variety of backgrounds and expertise, eg. nutritionists, geneticists, carcass and meats specialists, agricultural scientists, agronomists, ag-economists, bankers, accountants, financial advisers, pharmaceutical suppliers, etc. Within the veterinary profession, the team might also include clinicians, epidemiologists, pathologists and laboratory diagnosticians.

As with any winning team, the members must be cohesive, cooperative and committed to the success of the endeavor. This requires regular interaction; goal setting, planning, assessing, reviewing, recommending, implementing, and communicating, both oral and written.

Implementation of knowledge into action and a cooperative commitment to the client is essential.

Delivery of veterinary services relies on greater planning, time and activity organization, and greater involvement in directing management practices. This entails 1) regularly scheduled and some unscheduled visits (most of the traditional veterinary services fit in this unscheduled visits category); 2) record keeping; 3) surveillance, baseline evaluation, problem identification; 4) emergency preparedness; 5) client education; and 6) special services and programs, eg. artificial insemination, estrous synchronization and embryo transfer.

The beef practice veterinarian must change as does the beef producer to meet the challenge of changing times!!! Many veterinarians and producers desire the fuller, broader, array of services and interactions. These will be increasingly available in the next decade. We can look to a progressive new relationship between the veterinary profession and the beef producer...an organized, systematic approach to our businesses rather than a fire-engine, meet the crisis-type of management previously utilized.

THE NEW TOOLS OF HEALTH MANAGEMENT

The tools available for herd health and production management are increasing as rapidly as needs are being identified. The technological advancements in other fields are significantly impacting the area of beef health management. Notably, the fields of electronics and bioengineering are and will continue to have an impact.

COMPUTER AND ELECTRONIC TECHNOLOGY

Computers, notably, have influenced the way in which herd records for production and health are maintained and utilized. The ability to evaluate herd progress, pin-point problems and assess trends in the herd is greatly expanded. The producer has the capability of performing the what-if game with production and disease models to assess the value of different management practices in his situation.

The electronic technology, including computer chip technology, permits rapid communications by electronic mail or fax machines. This permits the relaying of information to and from the producer, eg laboratory reports from diagnostic laboratories, records transfer to veterinarians, nutritionists, buyers, etc. This communication technology extends to satellite transmissions, video tapes, etc. These media present a potential for extension conferences and communication of audio-visual educational materials quickly, efficiently and relatively inexpensively.

One other sample of electronic technology being used more frequently is the ultra-sound machine. This tool represents a boon to cattle marketing eg. carcass fat and loin eye area evaluation, as well as early and accurate pregnancy diagnosis. Other diagnostic uses are being tested for this and

other tools as we stretch to extend our own five senses to better understand the unknown.

BIOTECHNOLOGY

The ability of man to understand the mysteries which govern life itself is enlarging tremendously. This new understanding focuses on bioengineering. Bioengineering holds a huge economic market potential for pharmaceutical companies and related companies. For this reason, large amounts of research dollars are being applied in these areas. Of prime importance to this research is biogenetics, gene mapping and cloning of genes and proteins.

Vaccines

Recently, an Australian pharmaceutical company announced the development of a cattle tick vaccine. This vaccine is touted as having advantages over chemical control methods, in that there are no toxic residues, it is safe, it is easy to administer and it is given less frequently. The vaccine was made possible by identifying a specific tick protein, mapping it out genetically, producing a gene for the protein and placing it in a 'commercial' bacteria strain which would produce large quantities of this antibody-stimulating-protein antigen.

As diseases are identified which impede the health and production of livestock, either by advanced techniques or proven older techniques, the challenges will be met and subdued. One example is the recent development of a vaccine against Trichomoniasis and improved vaccines against IBR, BRSV, etc.

Another innovative development has been the addition of genetic markers to vaccine strains of modified-live viruses. These genetic markers permit the recognition of a disease strain virus versus a vaccinal virus strain. A disease titer can be distinguished from a vaccine related titer.

Diagnostics

Diagnostic tests are being developed which are more sensitive and specific. That is to say, the tests are more able to identify animals which are truly affected by a disease, as well as those which truly are not affected. Much of this new technology relies on bioengineering use of monoclonal antibodies. With these, ELISA assay techniques are used to identify antigens and antibodies specific to certain disease conditions. Also being used are DNA probes that can identify the presence of a particular disease organism.

Treatment

New antibiotics and pharmaceuticals can be expected to find application in the beef industry. These products will have greater efficacy and be better targeted to accomplish their intended task. Hormonal growth promotants, implants and stimulants will continue to be developed and improved. With these new products, as with the products currently on

the market, concern will persist as to residue levels and health implications. This issue will be considered later.

REPRODUCTIVE AND GENETIC MANAGEMENT

The ability of geneticists and reproductive biologists to manipulate the biological development of the calf will affect, maybe even profoundly, the way in which breeding stock and genetic pools are handled. Estrous synchronization and the subsequent use of artificial insemination continues to offer a means of rapid genetic improvement in beef cattle. The technology associated with embryo transfer continues to expand, including the ability to 'sex' embryos and to culturing and cloning procedures.

These techniques, in combination with the bioengineering techniques described under the biotechnology heading, may well lead to methods of genetic improvement called genetic enhancement. Genetic enhancement permits the addition of specific genes which may provide production boosts or the deletion of those responsible for detrimental characteristics. This may provide for disease resistance, eg. tick and nematode resistance, or trait improvement, eg. meat quality and feed efficiency.

NUTRITION AND METABOLIC MANIPULATION

The influence of nutrition on good health and productivity is being increasingly realized. Nutritionists are better defining the nutritional requirements of cattle at different ages and conditions. The interactions of nutrients are being better mapped out and understood. With this comes improved understanding of the animal's biological utilization of feed stuffs. These combined understandings will produce a variety of new feed-additive products and methods of nutrient delivery, eg. rumen by-pass proteins.

New forages and forage handling procedures and equipment will provide new opportunities. Especially important will be the development of forages designed in Florida for the Florida environment and soil type. These forages and by-products will provide the energy, protein and nutrient supplementation needed by Florida cattle.

Low level antibiotics in feed will continue to be an issue. We may be compelled to conform with consumer demands and their perceived need for increased public safety.

HEALTH MANAGEMENT AND ANIMAL WELL BEING ISSUES

Product Quality:

The safety and wholesomeness of the product consumed by the public will be more and more an issue of focus. The public concern will be targeted at antibiotics and hormonal additives. The use of low and therapeutic levels of antibiotics poses several perceived threats 1) biological pressure on

bacterial strains towards a resistance to antibiotics, 2) subsequent bacterial resistance to treatment given human patients, and 3) the adverse reaction of sensitive individuals exposed to antibiotic residues in meat products. The concern over hormonal implants and stimulants is primarily a fear of adverse human reactions to hormonal residues. Consumer education and ensuing product confidence are major challenges for the 90's.

ANIMAL WELFARE/RIGHTS

Animal welfare and animal rights have become all too often words which incite anger in us toward those who, without understanding for our industry, speak out against us and it. This is an arena in which we must become familiar and active. Each cattle producer should become proud to declare himself an animal welfarist. I say, animal welfarist, not animal rightist. That may cause some to grit their teeth and shake their heads because of the vision it invokes. When we, who are working with cattle, can relate to the definition of animal welfare, we will realize we were concerned about this before they made it an issue. **Animal welfare** refers to the sound husbandry practices directed towards the animals over which we have stewardship. The cattle provide for the needs of man and we in turn provide for their needs. Most cattlemen have lived ardently by this all their lives.

Animal rights, on the other hand, projects another dimension. That is, animals have rights on a par with humans. By this definition, man has no more right to use or exploit an animal than he does another human being. This would preclude even the keeping (or enslaving) of a seeing-eye dog. The ramifications of this philosophy does keenly impact our way of life and all other humans.

Animal husbandry, or sound animal welfare, demands, and will demand, increasing producer judgement and sensitivity. This will require less 'macho' display while handling and performing management procedures. We will need to develop and/or discover new management techniques to reduce cattle discomfort and stress, and augment their quality of life. Cow-calf producers, as a whole, are good husbandmen, but their way of life must be understood by the consuming public.

Commodity groups and individuals will be more involved in educating the public, portraying a positive industry image and promoting their product. We will be speaking up louder in support of 'wise' use of our animal

resources, our land and our environment. In summary, we will need to declare a united point of view and demonstrate a sound, concerned husbandry.

DISEASE CONTROL AND ERADICATION

Disease control and eradication will continue to be an issue and a concern. Brucellosis and tuberculosis will continue to be the diseases of focus, though with the continued, concerted effort of Florida cattlemen these should be under control by the early to mid 1990's. Florida's geographic proximity to the Caribbean leaves open the potential entry of other agents for which guard will be required, eg. foot and mouth disease, heart water, screw worms, etc.

CONCLUSION

The cattleman is a conservative and independent sort by nature. Cattlemen tend toward constancy amid all the change. Many of my comments may be considered outlandish and far fetched but we are likely to see these and many other changes in the health (and the husbandry) management of cattle. Change in this and most industries comes as a small but innovative group dive into uncharted waters while a large group of watchers wait to see. They learn from their mistakes, we make the needed adjustments. Over time positive change takes place. The 1990's hold in store a tremendous number of potential positive changes. They will come slowly, but hopefully fast enough to keep pace with the pressures from outside of the industry.

Above all we will need to realize that beef is a product for people. The consumer is now more concerned about our product. By our production methodology and by strong, positive public relations, we can provide a healthy, nutritious, well accepted product.

KEEPING BEEF RECORDS ON THE COMPUTER

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CowBase is a computer-based beef herd record system for recording production data and producing data summaries to assist in making management decisions. CowBase is designed to be easy to use by inexperienced computer operators and yet be a powerful management tool. Hardware requirements are IBM PC, AT or compatible with a minimum 384 K memory (preferably 640 K) and two floppy disc drives.

CowBase consists of two groups of programs, one dealing with cow/calf records and the other with herd inventory records. The programs are selected from a series of menus. Since information needs are different for each ranch, the program is designed so that information collected can be varied in relation to its anticipated use in an appropriate report. Thus, there is a core of basic data such as animal identification, birth date, dam identification and a weaning weight that is required with plenty of opportunity to record and utilize additional data. The Wean summary is a routine for combining production and

inventory data to produce a summary of the herds production for the year (Figure 1).

Data entry has been made as easy as possible through integration of programs so that data entries are made only one time. Where previous information is already recorded, the cursor can be set to appear only where new data need be entered. When there is data of a repetitive nature, such as wean date, there is an automatic entry feature that can be utilized. CowBase can be used in a laptop computer to quickly and easily record weights and other data as it is obtained while the cattle are being worked. As soon as the work is completed reports can be generated, evaluated and selections made before the cattle leave the pens.

A number of utility programs are included to facilitate adaptation of the system to fit any management information requirements. Some examples are custom sorting of various listings, choice of adjustment methods for age of dam and sex of calf, weaning weight adjusted to a standard age other than 205 days, reports sorted or summarized by user-specified codes.

Lifetime sire and dam reports which list and summarize lifetime progeny data are available by sending a disc with the years wean data to the FBCIA. The completed lifetime summaries will be returned both on disc and on paper.

Figure 1. SAMPLE OUTPUT FROM THE COWBASE PROGRAM:

| SAMPLE RANCH Wean Summary 1986 | | | |
|-------------------------------------------------|------------|----------------------------|----------|
| Number of Females in Herd: | 176 | Number of Calves Weaned: | 208 |
| Number of Cows Exposed To Breeding in 1985: | 263 | Average Weaning Age: | 212 Days |
| Number of Cows Culled: | 99 | Average Weaning Weight: | 525 lbs |
| Number of Cows Died: | 5 | Average 205 Day Weight: | 561 lbs |
| | | Average ADG: | 2.13 lbs |
| Average Cow Age: | 4.2 Years | % Calves weaned of | |
| Length of Calving Season: | 123 Days | Females currently in herd: | 118.2 % |
| | | *Cows exposed in 1985: | 79.1 % |
| Total Pounds Weaned: | 109278 lbs | | |
| *Pounds Calf Weaned Per Cow exposed in 1985: | 415.5 lbs | | |

*These are the most important figures used to determine herd productivity

GRAZING MANAGEMENT OF IMPROVED PASTURES

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SUMMARY

Grazing management can be a very powerful tool to influence plant and animal performance in forage-based livestock systems. For this tool to be used effectively, however, the producer must understand both plant and animal requirements for production, and then choose a management that balances the two. The most important choices to be made in designing a grazing management system are how close and how often the pastures are going to be grazed. These choices affect pasture performance which subsequently determines how well the animals will perform.

INTRODUCTION

Choice of grazing management will affect pasture productivity, forage nutritive value and stand longevity. Profitability of enterprises that are based on grazed forages will be greatly influenced by the way in which pastures are managed. This paper will provide an overview of the objectives of grazing management systems, discuss what management tools are at our disposal that affect plant and animal performance and look at the advantages and disadvantages of several approaches to grazing management; including high intensity, short duration grazing.

DEFINITION AND OBJECTIVES OF GRAZING MANAGEMENT

Grazing management has been defined as the manipulation of livestock grazing to accomplish a desired result (Pieper and Heitschmidt, 1988). What the desired result is will depend upon your enterprise, but certainly economic goals will be important. Specific objectives of a grazing management system may include 1) high production of forage per acre, 2) efficient use of the forage produced (i.e., a high percentage of forage produced is consumed), 3) long-term persistence of the pasture and 4) high level of production per animal and per acre. A fifth objective is that the grazing system match the needs of the producer in terms of profit margin, level of risk and managerial skill. The bottom line is that many tools are available to the pasture manager, but economic conditions and the skills/interest of the individual will determine which ones are useful in a given situation.

PLANT VERSUS ANIMAL REQUIREMENTS

Too often we have a bias toward either the pasture or the animal with the result that one receives more careful attention than the other. In a forage-based livestock system a narrow focus is not wise because the overall productivity of the system depends upon both plant and animal. Intelligent grazing management decisions must be based on an understanding of the requirements of both. Long-term profitability can be maintained only when the needs of plants and animals are kept in balance.

Plant Requirements for Persistence

The major effects of grazing livestock on pasture plants are due to defoliation, trampling and deposition of waste. Unlike row crops which grow without interference from animals, forages must survive these stresses and regrow to face them again.

Plants and grazing animals have evolved together over many years. In the process, grazed plants have developed ways of protecting themselves from defoliation. These include 1) maintaining a reserve supply of nutrients for regrowth in a part of the plant that is generally not grazed, 2) having branching or low growing stems that keep some leaf away from the animals and 3) maintaining living buds below the grazing height so that new shoots can replace those that the animal consumes. If we are aware of these protective devices and know when the plant will rely on them, we can intelligently manage the pasture. It is important to remember that although the plant is protected from the animal to some extent, overgrazing can occur to such an extreme or so often that the plants' defenses are overcome and it dies.

Animal Requirements for Productivity

The two basic requirements for livestock on a pasture-based system are adequate quantity (amount available) and quality (nutritional value) of forage. Overstocking not only affects the pasture, but it will also reduce animal performance because of a shortage of forage for grazing. Maturity is the major factor affecting the nutritional value of forages. Grazing a pasture frequently may ensure that animals have access to immature, high quality forage, but if the plant is not adapted to this type of management it may severely limit pasture growth or result in stand loss. On the other extreme, infrequent grazing may result in large quantities of forage being available for livestock, but it may be so low in protein and digestible energy that performance is still poor.

Another important point to remember is the difference in requirements of various classes of livestock. Mature bahiagrass may be a very adequate ration for a dry beef cow, but its use may result in large weight losses for a growing heifer.

It is clear that we need to understand the requirements of both the plant and the animal to develop successful grazing management strategies.

AREAS OF CONTROL IN GRAZING MANAGEMENT

What tools do we have available in designing a management system? Initially, the producer must determine which forage plants are adapted to his/her location, what level of inputs (weed control, fencing, fertilization) is likely to be profitable, and what class of livestock will be most useful for their situation. Having established these aspects of the enterprise, the most important tools available for grazing management are selecting the grazing intensity (a stocking rate for a pasture, or a plant stubble height when you will pull cattle off the pasture) and the grazing frequency (length of the rest period between grazings).

Grazing Intensity

In our opinion the most important decision relative to managing your pasture is how close you are going to graze it. This will determine whether the plants will have energy reserves, leaf or living buds available for regrowth after grazing. You determine this by the stocking rate that you choose or by the decision to graze a grass to a specific height. If grazed too closely the stand may be lost and/or the animals may be undernourished. If not grazed closely enough, beef production per acre will be limited, and likely the nutritional value of the forage reduced.

What must be considered when deciding on a stubble height to graze to, or a stocking rate to use? Sensitivity of the pasture to overgrazing and sensitivity of the animals to a period of insufficient forage are critical. For example, bahiagrass can be grazed considerably closer than can limpograss. If there is a shortage of pasture and both grasses are grazed into the ground to feed your animals, bahiagrass will likely come back but limpograss stands may be damaged. If the type of animal in use is able to compensate in the future for poor performance during a shortage of forage, then you may decide to graze the pastures as close as the plants will tolerate even if that type of management leads to animal weight loss. Each situation requires thought and the knowledge of how both the plant and animal will respond. No one guideline can be used for all grasses or all types of animals at every time of the year.

Other important factors affecting the choice of grazing intensity relate to the flexibility that a producer has to adjust animal numbers or to supply feed in addition to pasture. Obviously, if the pasture is the only source of feed and the number of animals cannot be profitably adjusted by buying or selling, then stocking should be done conservatively. In other words, the stocking rate used should be what can be supported on the land in a very poor year. If there is potential and profit in conserving forage as silage or hay, buying forage, irrigating during drought or adjusting animal numbers, then there is less risk in stocking at a rate that would be appropriate for the average year. In Florida's cow-calf enterprises, flexibility is limited by economics and most

stocking decisions must be made conservatively.

Grazing Frequency

Our first choice relative to grazing frequency is between continuous and rotational grazing. Rotational grazing means that a pasture is divided into two or more subunits called paddocks, and the paddocks are regularly grazed and rested in an orderly sequence. Continuous grazing, also called continuous stocking, occurs when the pasture is not subdivided and cattle are given continuous access to the entire area.

Relationship Between Grazing Intensity and Frequency

There is give and take between grazing frequency and grazing intensity. If a grass is grazed very closely, then it will generally require a longer rest period than if a taller stubble was left. Likewise, leaving a taller stubble may allow more frequent grazing than if plants were grazed closely. It is critical that we can predict how a plant will respond to the management we impose, so that we do not destroy stands of improved pasture.

ROTATIONAL VERSUS CONTINUOUS GRAZING

The primary reasons to graze rotationally include 1) survival of some pasture plants depends on it, 2) to increase beef production/acre or 3) to closely fit the nutritional needs of a given class of animals with the pasture that they are grazing.

Plant Survival

When grazed, plants must maintain either leaf to produce energy for regrowth, or stored reserves to provide that energy. If frequently defoliated, plants may not have enough time to grow new leaves and replenish their supply of reserves before being grazed again. The result is that after each grazing the plant has less reserve energy than before, and eventually its reserves will be gone. A rest period allows the plant to fill its reserve reservoir before another grazing.

Increase Beef Production/Acre

This point is still somewhat controversial, but there are experiments, particularly with temperate forages, that suggest an increase in production/acre with rotational grazing. Blaser (1986) reported from 24 to 40% higher milk yields per acre for rotationally grazed legume-orchardgrass pasture than when the same pastures were continuously grazed. The higher yields occurred because the forage was better utilized and stocking rate could be increased. Individual animal performance was the same on both systems.

Fit Nutritional Needs of Cattle

Rotational grazing allows the producer to allocate forage to the cattle based on their nutritional needs. Animals needing higher levels of nutrition, like replacement heifers or

stocker steers, can be given first access to a paddock and be allowed to graze the top part of the canopy. Then they can be moved on to the second paddock, while animals with lower requirements, like cows, can finish grazing the first paddock to the desired stubble height. This first and second grazer or leader/follower system is not likely to increase gain/acre over a regular rotational management, but it does allow the producer to efficiently allocate the most nutritious forage to the animals that need it. The same type of system could be used for creep grazing nursing calves as long as the paddocks were separated by a creep gate. The calves could move to the next paddock to graze the plant tops, and the cows would finish grazing the less nutritious forage.

Advantages of Rotational Grazing

Rotational grazing may be preferred over continuous grazing because with rotational grazing 1) it is easier to minimize weeds and prolong the life of the pasture, 2) the producer sees the cattle and pasture more often and manages both more effectively, 3) there are more management options in terms of matching animal needs with pastures, 4) the stocking rate can generally be increased and the pasture is better and more uniformly utilized and 5) beef production/acre can be increased.

Advantages of Continuous Grazing

Continuous grazing may be preferred over rotational grazing because 1) it requires less initial expense in terms of fence, water lines, etc., 2) less labor is required, 3) there are fewer decisions and management is less complicated and 4) there is less variation in the nutritional value of the animals' diet from day to day than under a rotational system.

HIGH INTENSITY, SHORT DURATION GRAZING SYSTEMS

Grazing management consultants, electric fence companies, and others have recently become more vocal in their support of the concept of high intensity, short duration grazing systems in Florida. This concept is not new, and is merely a type of rotational grazing. The major difference between it and more traditional rotational grazing methods is the number of paddocks that the pasture is subdivided into. Typically, it is recommended that more than 16 paddocks be used and of course this number may be much higher.

The benefits attributed to this approach are many, some of which are no less than miraculous. In many cases, no data are available to support these claims.

We see potential advantages to this type of system. These advantages should be very similar to those listed above for rotational grazing. It is quite conceivable that increasing the number of paddocks will minimize spot grazing and increase the percentage of forage produced that the animals actually consume. This may result in moderately higher stocking rates and gain/acre as number of paddocks increases.

In this type of grazing management as with any other, the most important choices you will make involve the selection of a grazing intensity and frequency. Be sure to remember that overgrazing will kill pastures no matter how fancy your fences are or the number of paddocks you have. You still must know your plant and the height to which it can be grazed safely. Number of paddocks should be determined based on how frequently you feel you can move the animals and how long the average rest period should be. In Florida most of our warm-season grasses should be grazed every 28 to 35 days during summer. If you want to move cattle every day, then you will likely need about 28 to 35 paddocks; if every other day, then 14 to 17 paddocks.

Unfortunately, we do not have any data from Florida that support or negate the claims being made. This kind of research requires a large number of pastures and animals, daily attention from trained support personnel, and constant supervision. Funds to support this type of research are not currently available and it may be up to producer groups to channel checkoff dollars or some other source of funds to these projects if they are to be done.

In terms of recommendations, we can only say that if the claims made sound too good to be true, they probably are. We do not question that marked increases in beef production/acre can occur when pastures are well managed compared to when they are not managed. What has not yet been established to our satisfaction is whether a high intensity, short duration grazing system will outperform a well managed rotational grazing system. In other words, are the extra dollars spent on fencing and labor to move the cattle every day or two, worth it?

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THE EFFECT OF BACKGROUNDING SYSTEM AND CATTLE TYPE ON NET RETURN

by

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Beef cattle production in Florida encompasses a wide range of animal types and production systems. Crucial to the success of a post-weaning production system is an appropriate match of animal type with a feeding program. The purpose of this paper is to report the results of recent feeding trials conducted at the Subtropical Agricultural Research Station in Brooksville. In these trials, steers which encompassed a wide range of cattle types, were placed in five different backgrounding-finishing systems. The effect of animal type and feeding system on animal performance was reported at the 1988 Beef Cattle Short Course (Kunkle et al.). In this paper, costs and returns for each animal are computed, and the effect of cattle type and feeding system on net returns is examined.

ESTIMATION OF COSTS AND RETURNS

Steers were procured at Florida auction markets in November, 1985 and September, 1986. Cattle were transported to the ARS/IFAS Subtropical Beef Cattle Research Station near Brooksville. All cattle were put through a preconditioning program. Each year, steers were assigned to one of five feeding programs. In this paper, these five feeding programs are called system 1 through system 5. System 1 involves only feedlot feeding of cattle. Animals in this system were randomly assigned to two groups with one group finished at Brooksville and the other group transported to the North Florida Research and Education Center at

Quincy and finished in those feedlot facilities. All animals in systems 2 through 5 were placed on bahia pastures in early December. Animals grazed on these pastures and were offered round bales of bahiagrass hay cut in September. Animals in systems 2 and 3 were supplemented in both years with 1.0 lb/head/day of soybean meal. In 1985-86, steers in systems 4 and 5 were supplemented with 7.1 lb/head/day of a molasses-soybean meal slurry. In 1986-87, steers in systems 4 and 5 were fed 6.2 lb/head/day of 75% ground shelled corn and 25% soybean meal.

In April of each year, steers in systems 2 and 4 were placed on bahia pastures, and steers in systems 3 and 5 were placed on perennial peanut pastures. In early September, all steers in systems 2 through 5 were placed in feedlots. Animals in each system were randomly assigned to two groups. One group was finished in Brooksville and the other group was finished in Quincy. In the feedlot, all animals were fed a ration which averaged 80% shell corn, 10% cottonseed hulls, and 10% protein supplement. The animals were fed until they reached an estimated 0.45 in. fat over the ribeye then were slaughtered for carcass evaluation. Based on the carcass evaluation, each carcass was assigned a yield and quality grade.

Using data from Livestock, Meat, and Wool Market News, a matrix of carcass prices based on yield and quality grade was estimated. Using \$1.00/lb for Choice-3 as the base price, the premiums and discounts for other grade-yield combinations are shown in Table 1. Any carcass weighing less than 550 pounds was reduced 8% in value. Using the appropriate price in Table 1 and multiplying by carcass weight gave gross revenue for each animal.

Costs for each system were based on the cash costs associated with preconditioning, winter grazing, summer grazing and feedlot finishing. These costs are shown in Table 2. Costs for perennial peanut pasture include pro-rata establishment costs. The estimated establishment cost is \$389.20 per acre. This cost was depreciated over 10 years using the straight line method, and interest was charged using a 12% rate. No charge was made for winter bahia pasture.

Stocking rates in the summer grazing programs were

based on spring forage availability, so large quantities of excess forage were produced in the summer months. This excess forage was harvested for hay, and a credit for hay was applied to pasture costs. Interest on operating capital was charged using a 12% interest rate. Stocking rate for both bahia and perennial peanut grazing was approximately .7 hd/ac.

Upon purchase, each steer was visually evaluated for a number of traits including weighed and frame size, condition, muscling, temperament, bone, chest capacity and breed (allocated to Brahman, Continental, and English). Two Florida-based order buyers were asked to provide bids for each animal at the beginning of the trial in December of each year. The maximum of these bids was taken to be the purchase price of the calf.

Net revenue per animal was computed by subtracting all feeding costs and initial animal costs from gross revenue. Average net revenue per head for each system is shown in Table 3. Overall net revenue per head ranged from -\$249.07 to \$232.93 with an average of \$-39.20.

RESULTS AND DISCUSSIONS

In Table 3 we find that on the basis of average net return for all cattle, system 5 ranked highest, followed by system 1, system 4, system 3 and system 2. In absolute terms, system 5 and system 1 exhibited similar performance with systems 2, 3 and 4 trailing behind. The relative success of system 5 is that animals from this group had the highest average carcass weight. (Table 4) Although a relatively high proportion of the animals in this system graded Choice, a relatively high proportion also graded Standard. System 5 also, on average, had poorer yield grades. Higher carcass weight offset lower selling prices due to lower quality and yield grades. System 1 fared relatively well because a high proportion of animals in this group graded Choice, and few animals in this group graded Standard. Average yield grade was also best for system 1.

Systems 2 and 3 are those systems in which a low level of nutrition was provided in the winter period. The poor average net returns compared to the other systems suggests that at least a moderate level of nutrition in the cool season should be maintained.

The primary focus of this paper is to examine the joint impact of cattle type and feeding system on net returns. A two-way analysis of each trait and feeding system was conducted. Limited space does not allow a complete discussion of those results. Several interesting results are presented.

Medium frame cattle show higher net returns in systems 1, 2, and 4, while large frame cattle fare better in systems 3 and 5 (Table 3). Systems 3 and 5 are those which utilize grazing on perennial peanuts in the summer. These results suggest that the larger frame cattle profit from the higher level of nutrition provided by the perennial peanut pasture

during the summer phase.

Net returns by system and initial condition suggest that relatively fleshy cattle show the poorest net returns (Table 3). Thin cattle did well in systems 3 and 5 with an average net return of \$75.56 for thin cattle in system 5. This result confirms the concept that thin cattle, when confronted with adequate nutrition, will be efficient in feed conversion and provide higher net returns than fleshier cattle.

Except for system 1, average net returns were much lower in 1985-6 compared to 1986-7 (Table 3). The spring of 1986 was dry in the Brooksville area and pasture growth was poor. In 1987, ample rainfall was received throughout the warm season, and forage was abundant. Much of the explanation of higher net returns for the perennial peanut systems is that a large quantity of hay was harvested in 1987 which significantly reduced grazing costs for that year.

Animals were divided into three groups based upon the initial price determined by the maximum of the bids provided by two order buyers (Table 3). In general, less expensive cattle show higher net returns. In the case of system 5, less expensive cattle far out perform the other two groups.

The results for bone, chest capacity, initial weight and breed showed little discernable pattern. Larger boned cattle did not exhibit higher net returns. Animals with 30 to 40 percent Brahman breeding performed better in system 5, but otherwise Brahman breeding had little effect.

The relationships of visual characteristics to buyers' price are shown in Table 5. This shows the average initial prices of the different types of cattle and reflects some of the pricing relationship of different weights and types of cattle in the fall of 1985 and 1986.

CONCLUDING REMARKS

The results of grazing trials which focused on the impact of animal type and alternative backgrounding systems on costs and returns has been presented. The results suggest that backgrounding system and animal type do interact and can have large impact on net returns. Thin and large frame cattle appear to benefit from higher levels of nutrition provided by perennial peanuts. Medium frame cattle do best in direct to the feedlot and bahia-based systems. Weather greatly influences net returns in programs utilizing perennial peanuts. Further work needs to be done to better quantify the interaction between feeding program and animal type.

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Table 2. FEED AND MISCELLANEOUS COSTS
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Table 1. CARCASS PRICES FOR DIFFERENT QUALITY AND YIELD GRADES (\$/LB.)^a

| Quality Grade | Yield Grade | | |
|---------------|-------------|--------|--------|
| | 2 | 3 | 4 |
| Choice | 1.0068 | 1.0000 | 0.8593 |
| Select | 0.9253 | 0.9185 | 0.7778 |
| Standard | 0.8481 | 0.8413 | |
| | 0.7006 | | |

^a Carcasses weighing less than 550 lbs. had carcass prices reduced 8%.

| | (\$/ton) | |
|------------------------|----------|---------|
| Hay | 50 | |
| Soybean Meal | 250 | |
| Molasses/SB slurry | 98 | |
| Corn- Soybean Meal | 134 | |
| Feedlot Ration | 120 | |
| | Bahia | Peanut |
| | (\$/Ac) | (\$/Ac) |
| Total Pasture Costs | 38.40 | 105.09 |
| Hay Credit | | |
| 1st Year | -12.50 | -35.00 |
| 2nd Year | -12.50 | -77.50 |
| Adjusted Pasture Costs | | |
| 1st Year | 25.90 | 70.09 |
| 2nd Year | 25.90 | 27.59 |

Table 3. EFFECTS OF SYSTEM, FRAME SIZE, CONDITION, YEAR AND INITIAL BUYER PRICE ON NET RETURN, \$.

| | System | | | | | |
|---------------------------------|---------|-----------|------------|--------------|---------------|--------|
| | 1 | 2 | 3 | 4 | 5 | |
| | Feedlot | Low Bahia | Low Peanut | Medium Bahia | Medium Peanut | All |
| All Cattle | -11.41 | -86.46 | -67.04 | -33.22 | -8.98 | -39.20 |
| Frame Size | | | | | | |
| Small | -16.09 | -123.72 | -105.77 | -40.41 | -45.00 | -61.54 |
| Medium | -6.31 | -60.94 | -64.71 | -28.88 | -9.68 | -33.35 |
| Large | -14.16 | -97.06 | -47.26 | -33.69 | 17.38 | -31.17 |
| Condition | | | | | | |
| Thin | -0.95 | -48.06 | 0.63 | -30.84 | 75.56 | 8.06 |
| Medium | -10.67 | -79.08 | -61.20 | -20.67 | -30.49 | -38.53 |
| Fleshy | -32.27 | -141.99 | -134.20 | -84.76 | -23.27 | -85.82 |
| Year | | | | | | |
| '85-86 | -1.97 | -89.10 | -135.84 | -53.37 | -72.41 | -70.99 |
| '86-87 | -18.30 | -82.80 | -0.99 | -11.40 | 54.44 | -7.67 |
| Initial Buyer Price, \$/100 lb. | | | | | | |
| < 61 | 19.90 | -22.58 | -8.47 | -30.98 | 73.03 | 10.45 |
| 61 - 64 | -25.83 | -107.08 | -78.09 | -25.99 | -42.62 | -53.89 |
| > 64 | -22.21 | -137.33 | -118.47 | -64.97 | -40.57 | -67.80 |

Table 4. SYSTEM EFFECTS ON CARCASS CHARACTERISTICS

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| | System | | | | | All |
|----------------------------|--------------|-------------------|--------------------|----------------------|-----------------------|-----|
| | 1 Feedlot | 2 Low Bahia | 3 Low Peanut | 4 Medium Bahia | 5 Medium Peanut | |
| Hot Carcass Weight, lb. | 656 | 685 | 710 | 720 | 756 | 705 |
| Fat Over Ribeye, in. | .49 | .50 | .52 | .48 | .54 | .51 |
| Quality Grade, % Carcasses | | | | | | |
| Choice | 27 | 23 | 22 | 18 | 31 | 22 |
| Select | 71 | 70 | 76 | 64 | 52 | 67 |
| Standard | 02 | 07 | 02 | 18 | 17 | 11 |
| Yield Grade, % Carcasses | | | | | | |
| 2 | 61 | 37 | 39 | 46 | 35 | 45 |
| 3 | 37 | 56 | 53 | 46 | 50 | 47 |
| 4 | 02 | 07 | 08 | 08 | 15 | 08 |

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Table 5. RELATIONSHIP OF WEIGHT AND VISUAL CHARACTERISTICS TO INITIAL BUYER PRICE

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| Characteristic | No. Steers | \$/100 lb. |
|--------------------------------|------------|------------|
| Initial Weight, lb. | | |
| Under 425 | 52 | 64.04 |
| 425-500 | 92 | 61.71 |
| over 500 | 105 | 61.93 |
| Frame Size | | |
| Small | 58 | 63.90 |
| Medium | 110 | 61.82 |
| Large | 81 | 61.78 |
| Condition | | |
| Thin | 38 | 61.28 |
| Medium | 170 | 62.28 |
| Fleshy | 41 | 63.36 |
| Muscle | | |
| Heavy | 147 | 63.13 |
| Medium | 102 | 61.09 |
| Temperament | | |
| Docile | 151 | 63.04 |
| Slightly Aggressive | 98 | 61.13 |
| Bone | | |
| Heavy | 62 | 62.58 |
| Average | 148 | 62.55 |
| Light | 39 | 60.85 |
| Chest Capacity | | |
| High | 90 | 62.78 |
| Average | 159 | 62.19 |
| Proportion Brahman Breeding, % | | |
| Under 30 | 77 | 63.15 |
| 30-40 | 96 | 62.59 |
| Over 40 | 77 | 61.03 |

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SALES CONTRACTS FOR CALVES

Dan Sumner
Rancher
Balm, Florida

In keeping with the theme of "Challenges and Opportunities in the Nineties", I feel that the area of marketing offers both! Once you have produced a desirable product, it must be marketed to the greatest advantage to fully realize its worth.

One valuable tool of marketing is forward contracting, or establishing a selling price in advance of the actual delivery. We contract in April or May and deliver in July. The contract price is based upon the average weight and grade of a load of calves.

Contracting presents the challenge of producing what the market wants in uniform truck load lots. This is in contrast to the producer producing what he wants and then marketing that on an individual basis. Contracting presents further challenges in the logistics area, e.g. penning, sorting, hauling, weighing, loading tractor-trailers, etc.

Along with the challenges, contracting also offers opportunities to:

1. Sell calves during a traditional high market for delivery during a lower market season.
2. Take advantage of truckload prices.
3. Establish projected sales figures in advance for budgeting and cash flow and tax planning purposes.

4. Take advantage of better production practices, e.g. dehorning, vaccinating, working, etc., thereby avoiding discounts associated with calves coming from the Southeastern Region.
5. Establish a history of performance, especially if calves can be followed through to the end point (slaughter and grading).
6. Establish a market closer to the end point. This will become more important as the industry matures and integrates further. Hopefully, some broker margins can be gained in the process.
7. Establish backgrounding and health management programs with buyers, which aid in the transition of calves from the ranch to the buyer, again avoiding discounts and increasing net return.

Contracting offers the buyers some opportunities as well. It allows him to lock in a sell price in advance of delivery for budgeting feed, sales and all other planning purposes. He is also able to purchase a uniformly managed product directly from the ranch rather than mixed loads handled through markets, brokers, etc.

The only pitfalls I can see would be to contract calves early and have the cash market above the contracted price at time of delivery or to contract on a high market, have the market fall and the buyer not perform. However, in the latter case, I still have the cash market plus the deposit money.

I first became interested in contracting when our cattle numbers reached the point of being able to market in multiples of one hundred (a truckload lot is 100, 475 lb. calves) and two-thirds or more of the calves fell into the same weight and grade categories. To get this uniformity, we have shortened our breeding season and over ninety percent of our calves are born in a 45-50 day period.

In the past, every year near selling time, we would try to determine how late we could hold our calves to gain weight before the market would fall enough to offset the gains. Three years ago, we sold early only to have the market go up rather than fall, and we lost in price and weight as well. Last year we contracted early through a video sale and avoided the price drop experienced in relation to the drought. We felt much more comfortable holding our calves to maximize weaning weights after having contracted earlier.

In the contracts we have negotiated, an average weaning weight is predicted based on past experience and current conditions. The number of loads of calves and their delivery grade and/or type is established. From this information, a price per pound is negotiated and a deposit and the delivery date agreed upon.

To take into account some variance in the predicted weaning weights, a "slide" is agreed upon in which the price is adjusted downward for weight above the contract and upward if the calves are lighter. There is usually a weight bracket or "dead space" of twenty-five pounds either side of the predicted weight where the price remains the same, e.g., two years ago we predicted steer weaning weights in early May to be 525 lbs. but due to drought conditions we only realized 496 lbs. The contracted slide was an added three cents per pound to the selling price if the calves were below 500 lbs. Last year, in April we predicted 475 lbs. steers and, due to good spring conditions, the calves reached 520 lbs. This caused a price adjustment downward as the contract called for a nickel per hundred weight deduction for weight over 500 lbs.

From our stand point, we feel we are able to avoid some market fluctuations, do a better job of planning and maximize weaning weights by contracting our calves in the spring for summer delivery. Sooner or later it's bound to "catch" us. However, missing some "windfall" market would not likely cost us as much as the better management and planning necessary for contracting has benefited us.

Thank you for your time and patience.

ANIMAL RIGHTS AN ISSUE IN THE FUTURE

Farol Tomson, DVM
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"Hotel Drops Veal From Restaurant Menus"
"Factory Farming: The Experiment That Failed"
"Free-Ranging Chickens and Veal Now Available"

These topics are not of the future, they are here now. Massachusetts defeats a restrictive farming bill by a 76% vote, and farmers claim a victory. Others claim a shallow victory, realizing that if another 25% of the public is duped by this philosophy, Massachusetts will eventually pass this legislation.

This well-funded grass roots movement is successfully exploiting animal abuse incidents with the sympathetic press and sympathetic public. Americans have a soft and bleeding heart for the underdog.

Although the Animal Rights Movement, (ARM), doesn't exploit the surplus dog control problem, they certainly make sure research and teaching entities don't utilize them. Nowhere is our abuse and neglect more evident than in the dog and cat overpopulation. 1988 figures from four Florida counties reveal:

| <u>COUNTY</u> | <u>DOGS/CATS ADMITTED</u> | <u>DOGS/CATS EUTHANIZED</u> |
|---------------|---------------------------|-----------------------------|
| Alachua | 12,944 | 8,601 |
| Escambia | 16,620 | 14,271 |
| Santa Rosa | 6,731 | 5,891 |
| Leon | 10,195 | 6,880 |
| <u>TOTALS</u> | <u>46,490</u> | <u>35,643</u> |

And not one of these was used to advance teaching or research programs in the state of Florida. In fact, the University of Florida faculty pay \$200 per dog (to out of state dealers) to use them in veterinary education and research programs. UF used only 486 dogs last year; down from over 1300 several years earlier. The continuing, relentless pressure on politicians from the ARM will totally prohibit this source of dogs and cats from being used.

The above figures are from just four counties in Florida. Imagine what the entire state euthanizes! Another tragic aspect of this issue is the hidden cost associated with producing this animal protein. Average carcasses weigh 15 pounds; therefore, these counties produced 267 tons of carnivore at a cost of over \$172,000. These figures of four counties are typical of the waste and neglect in this aspect of animal welfare.



FLORIDA STATE FAIR YOUTH STEER FUTURITY

Don Wakeman
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University of Florida
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Charles Moore
Florida State Fair Authority
Tampa, Florida

The Florida State Fair will sponsor a youth steer futurity in 1990. The intent of the futurity is to provide top quality Florida bred steers to 4-H Club and FFA exhibitors at commercial prices with the opportunity to have a profitable project. In addition, we hope the futurity concept will create more participation from Florida cattlemen, stress more emphasis on educational activities for the participants and provide a competitive event that will showcase Florida steers. The exhibitors will participate in educational seminars discussing such topics as selection, feeding, record keeping and showmanship.

Steers will be obtained from producers and purchased by exhibitors in a futurity sale on July 22 at the Florida State Fairgrounds. Steers must be purchased at the sale to be eligible for entry in the show.

The judging objective will be to rank steers with consideration of values to all facets of the industry. The steers should exhibit conformation suggesting half-sisters would be desirable as replacement heifers for commercial cattle production, have a high rate of gain, acceptable

muscling and sufficient, but not excessive, outside fat covering. Available records and ultrasound fat thickness and ribeye area will be used in ranking the live steers. Steers that are extreme in body type, muscle expression and unsoundness of skeletal structure will be discounted. Live evaluation for carcass traits will be made by use of a quality-cutability index based on USDA cutability estimates adjusted for marbling with added discounts for USDA Yield Grades 4 and 5.

Carcasses will be judged according to standards established by the USDA dual grading system and the value of carcass cut out.

The premier champion will be determined by forty percent on the live placing and sixty percent on the carcass merits.

More emphasis and prize money will be placed on educational activities for exhibitors such as junior and senior showmanship, record books and herdsman awards. Premium money and trophies are also available for the gain in weight and carcass contest. Awards will be presented to the breeder of the Champion and Reserve Champion steers and the Premier and Reserve Premier steers. All carcass and performance information will be returned to the breeders.

To encourage participants to continue their education beyond high school, radio station WQYK is sponsoring scholarships for two college bound students that demonstrate outstanding participation in all areas of the steer program.

Further information on the futurity can be obtained by writing the Florida State Fair Youth Steer Futurity, P.O. Box 11766, Tampa, Florida, 33680.

ULTRASOUND AND CARCASS EVALUATION PROGRAM

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For the last several years, the major topic of the Annual Beef Cattle Shortcourse has been the changing demand for beef and the evolution of the beef cattle industry from a production orientated to a consumer orientated industry. Numerous speakers have discussed the need to produce cattle that have carcasses and meat in demand by the processor and, ultimately, the consumer. The goal is to remain competitive with other meat sources and the major theme is to: "Reduce plate waste (fat) without reducing taste".

To meet this challenge, we as cow-calf producers need to know more about the raw material (the calf) that we are producing. When our calves are grown and fed, what is the quality and quantity of lean meat produced? More specifically, do the calves when properly finished produce carcasses that meet the demands of the industry in terms of weight, quality and yield grade, and palatability (tenderness, juiciness and flavor)?

In 1987, the Florida Beef Cattle Improvement Association (FBCIA), which promotes the use of production records, became an agent for USDA Carcass Program wherein eartags can be purchased that will stay with the animals until they go to slaughter, carcass data is collected and the data are returned to the tag purchaser. A number of Florida cow-calf producers have used the tags and received carcass data on the calves they produced. The general response has been: "Now that I have this information, what the hell do I do with it".

In January of 1989, the FBCIA decided that the program needed to be broadened to include an expansion of the carcass data program and the implementation of ultrasound technology for use in selection programs to make improvements in carcass and meat characteristics in the cattle produced in Florida. In conjunction with the Animal Science Department, FBCIA has purchased state-of-the-art equipment, trained and certified operators, and initiated the service to cattle producers interested in making improvements.

My purpose today is to discuss this service in terms of what is offered and the costs. I will also discuss what I think is the best approach for a cattle producer in altering carcass characteristics. Dr. Hargrove will follow me and discuss how such information can be used in a selection program, particularly as it relates to selection for muscling. Later this afternoon, a demonstration of ultrasound will be conducted for those who have not seen this technology in action.

THE FBCIA ANIMAL, CARCASS AND MEAT

EVALUATION SERVICE

The FBCIA Animal, Carcass and Meat Evaluation Service was developed to provide a mechanism for cattle producers to obtain information on the products they were producing, to assist with interpretation of the information, and to assist with development of approaches to make any needed changes. This service will be conducted by faculty and staff of the Animal Science Department and administered by the FBCIA. Because of the cost of equipment, personnel and expenses, this is a fee based service as shown in Table 1. There is a per head cost depending on what information the producer wants, and a charge for travel expenses. These charges will allow us to keep our equipment updated as new technology emerges.

The services offered can be divided into two parts: Provide ultrasound data on breeding animals; and, provide carcass and meat palatability data on progeny.

The carcass and palatability data service is an expansion of the capabilities of the USDA eartag program. While the cost of the eartag program is reasonable (\$0.50 for the tag and \$1.50 for the data), the return of data has only been 60 to 70% and this program only provides carcass data, no palatability or gain data. For special groups of calves where you do not want to take the chance of not getting all the data, we will assist you in making arrangements to get the cattle fed, slaughtered and graded. If you want palatability data, we will get the samples, do the evaluations and return the data to you with our analysis and recommendations. If you are obtaining carcass information from other sources, we will assist you in compiling and interpreting the data.

The other part of the service will involve the collection of ultrasound data, specifically fat thickness and ribeye area at this time. We prefer to collect this on yearling bulls and heifers rather than mature breeding animals. These data when collected in conjunction with other production traits such as weight, frame size, scrotal circumference or pelvic measurements will be more useful. We are still debating the best approach for adjusting these figures to a common basis for comparative purposes and need more data to make these decisions. Thus, the service stipulates that we have access to all data for research purposes.

Ultrasound technology involves the use of sound waves at 16,000 cycles/second to produce an image of the different tissues within an animal's body. From this image, various measurements can be made, such as fat thickness and the cross-sectional area of muscles. Sound waves are emitted from a crystal and as the waves strike tissues of different densities, a portion of the waves are reflected back to the crystals. In early equipment, only one crystal was used and, thus, the image was based on one location. In the more modern equipment a probe with 64 crystals is used such that an image of the cross-section at a location is obtained. This modern technology, referred to as "real-time linear array ultrasound", was developed for human medical uses, but is

applicable to meat animals.

Modern ultrasound equipment allows for linear measurements of fat thickness to be made directly on the machine and for the video recording of cross-sectional areas of muscles for later measurement. As technology advances, measurement of areas on the machine should be possible. Perhaps in the future, marbling amount can be measured.

The accuracy of ultrasound measurements as related to those measurements on the carcass has been shown to be high for fat measurements and variable for muscle cross-sectional areas. Houghton (1988) indicated that correlation coefficients between real-time ultrasound and carcass measurements ranged from .42 to .92 for fat thickness and from .47 to .86 for ribeye area. These ranges in correlations indicate that accuracy is dependent on the operator, especially for area measurements where some interpretation of vague portions in the images is required. Accurate interpretation of ultrasound images is dependent on the operator's knowledge of anatomy, proper placement of the probe, proper scanning procedures and a thorough understanding of what the images represent. Because operator technique is so important in obtaining accurate readings, the Beef Improvement Federation (BIF) has developed a program to train and certify operators. Use of certified operators is preferred. The FBCIA service has two operators certified by BIF: Roger West and Randy Huffman. These two operators will make the measurements and the interpretations. Using certified operators will allow producers of purebred cattle to submit these data to the breed association for inclusion in sire summaries.

The recommended approach to improving the cattle you produce is a stepwise process: (1) Determine what you are producing now; (2) Determine where you want to go with your program; and, (3) Develop a plan to get to your goal. The first step is easy. By obtaining carcass and ultrasound data, you can determine quickly how your cattle are performing in the market place.

The second two steps are more difficult. It must be kept in mind that changes in carcass traits may adversely affect production traits. Since we have such limited knowledge in this area, we want to proceed with caution. There must be a happy medium so that our cattle economically optimize both production and meat traits. More research is needed before we feel comfortable with making too many recommendations. Secondly, there is so little information on potential sires relative to expected carcass traits of progeny, it will be difficult to make changes until more is available. However, the cattle industry needs to get started on the first step so that it will be ready to move into the second step when the information is available.

For more information on the program or to schedule services, please call Roger West at 904-392-2992 (office) or 904-373-5251 (home).

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| | | |
|--------------------------------------------|--|------------------|
| ULTRASOUND MEASUREMENTS^a | | |
| RIBEYE AREA AND FAT | | |
| <50 animal | | \$12/head |
| 50- 99 animal | | \$ 1 0 / h e a d |
| >100 animal | | \$ 8/head |
| FAT ONLY | | \$ 5 / h e a d |

| | | |
|---------------------------|--|----------|
| CARCASS MERIT | | |
| CARCASS GRADE DATA | | |
| <100 animal | | \$5/carc |
| >100 | | \$4/carc |

| | | |
|---------------------------------|--|------------------------|
| PALATABILITY^b | | |
| SENSORY PANEL | | \$15/carc ^c |
| W-B SHEAR FORCE | | \$ 5/carc ^c |

TRAVEL
 The livestock owner, show or sale will be expected to pay for all travel expenses which will include transportation, lodging and meals (per diem).

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^a A reduced rate of \$1.00 per head is offered for bonafide youth activities.
^b No minimums, but only done when grade data collected
^c These costs do not include the cost of the meat samples.

LITERATURE CITED

Houghton, P. L. 1988. Application of ultrasound in commercial feedlots and beef breeding programs. Ultrasound Training School for Carcass Merit, Texas A&M University.

Table 1. FLORIDA BEEF CATTLE IMPROVEMENT ASSOCIATION ANIMAL AND MEAT EVALUATION SERVICE FEES

AESCHYNOMENE FEED, SEED & NITROGEN

Wesley Williamson
Williamson Cattle Co.
Okeechobee, Florida

Williamson Cattle Company is a beef cow/calf ranch in Okeechobee County. Summers in south Florida, with our high temperature and excessive rain fall, make it difficult to provide a high protein forage for lactating cows and the suckling calves on them. Introduction of Aeschynomene into some of our pangolagrass and bahia fields have helped us

with this problem.

Aeschynomene is a sub-tropical summer legume native to South Florida. It's crude protein levels can be as high as 18-25% which is comparable to alfalfa. Aeschynomene grows in the warm months from spring to late fall. Some seed will germinate as soon as we get adequate moisture in the spring, but they can be killed due to a late March frost or a typical dry spring. Because of this I don't recommend planting and/or scarifying before May and preferably June. Aeschynomene should not be looked on as a crop for seed production purposes only. Its benefits are three fold.

Aeschynomene is a highly palatable forage that cattle

prefer and when mixed with bahia or pangolagrass, it is a good source of high protein forage during the summer months. The steers at our ranch have averaged 599# at 8-9 months old for the last three years. Much of the spring calves' (born January-March) summer gain comes from aeschynomene grazing from June to October.

The second benefit is in the nitrogen producing ability of this legume. A good aeschynomene field will produce more than 200 lbs. of nitrogen per acre in its leaves and nodules. This is equal to 600 lbs. of ammonium nitrate per acre. The cost of 600 lbs. per acre of ammonium nitrate at \$170.00 per ton would be \$51 per acre. The cost of 350 lbs. per acre of 0-10-30 for aeschynomene at \$105 per ton is \$18 per acre. The third and least predictable of aeschynomene benefits is seed production. Seed harvested at our ranch the last four years has averaged 96 lbs. per acre on a total acreage fertilized basis. The average value of this seed is \$35.03 per acre. $(96\#/2) \times .73$. Seed production has averaged 134 lbs. per acre when figured on a total acreage harvested basis. The average value of this seed is \$48.93 per acre. $(135\#/2) \times .73$.

Scarifying cost may run as much as \$8.50 per acre on already established fields and \$23 per acre for scaring and planting a field for the first time. The cost of this initial planting can be minimized if you incorporate the aeschynomene planting with your initial grass planting. The seed can be applied just ahead of the rollers after the grass sprigs are spread and disced in. If you are planning on renovating older pastures that have evolved into an undesirable grass such as smutgrass, this would be a good time to introduce a summer legume such as aeschynomene into those pastures.

If you are planting on a well prepared disced seed bed, 5 lbs. of hulled or 10 lbs. of unhulled seed per acre is adequate. If you are planting on an already established pasture you will need to chop or lightly disc the ground to insure good seed to soil contact. In established pastures I've found that a minimum of 10 lbs. of hulled or 20 lbs. of unhulled seed is needed per acre.

Hulled seed will generally germinate immediately and needs to be inoculated prior to planting. Unhulled seed will germinate slower and at different intervals. Generally, early plantings from April through June should be made with unhulled seed due to the unpredictable weather conditions. Late plantings from June through August should be made with hulled seed or a 50-50 mix of hulled and unhulled seed.

Grazing of aeschynomene should not start until it reaches a height of at least 3 inches. Rotational grazing of aeschynomene is best to minimize any selective grazing of the legume. Cattle and deer do prefer aeschynomene over any plant I know of, and in recent years, hunters in the gulf coast states have planted it specifically for whitetail deer.

Any aeschynomene that is worthy of seed production should not be grazed after September 1st. It is a good idea to get with your seed harvester at this point to get his opinion on

which fields may be harvestable.

TABLE 1. AESCHYNOMENE PRODUCTION RESULTS, 1985-1988

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| | Year | | | | |
|-------------------------------|----------|----------|----------|----------|----------|
| | 1985 | 1986 | 1987 | 1988 | Average |
| FERTILIZER USED: | | | | | |
| Acre | 290 | 470 | 246 | 740 | 437 |
| Analyses ^a | 0-12-24 | 0-12-24 | 0-10-30 | 0-13-39 | 0-0-59 |
| Month Applied | July | Sept. | Sept. | Jun/Sep | |
| Pounds/Acre | 300 | 350 | 350 | 470 | 368 |
| Cost/Ton | \$103.40 | \$ 99.91 | \$105.10 | \$144.38 | \$113.20 |
| Cost/Acre | \$ 15.51 | \$ 17.48 | \$ 18.39 | \$ 33.93 | \$ 21.33 |
| Cost/Acre Applied | \$ 18.26 | \$ 20.23 | \$ 21.14 | \$ 39.43 | \$ 24.08 |
| SEED HARVESTED: | | | | | |
| Acres Harvested | 20 | 470 | 110 | 650 | 313 |
| Pounds Harvested | 2,900 | 42,200 | 7,500 | 115,350 | 41,988 |
| Pounds Harvested/Acre | 145 | 90 | 68 | 177 | 134 |
| Owner's Share lbs./Acre | 73 | 45 | 34 | 89 | 67 |
| OWNER'S GROSS RETURNS: | | | | | |
| Selling Price/Pound | \$ 0.50 | \$ 0.50 | \$ 1.00 | \$ 0.80 | \$ 0.73 |
| Per Acre Fertilized | \$ 2.50 | \$ 22.45 | \$ 15.24 | \$ 62.35 | \$ 35.03 |
| Per Acre Harvested | \$ 36.25 | \$ 22.45 | \$ 34.09 | \$ 70.98 | \$ 48.93 |

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^aEach year's application contained micronutrients, 1988 was split application.