1988-89

BEEF PROFIT CLINICS

November 9 - Abingdon
Southwest 4-H Center
December 6 - Dublin
Dublin Methodist Church
December 7 - Lexington
Lexington Presbyterian Church
December 8 - Lynchburg
Lynchburg Livestock Market
December 13 - Halifax
Halifax Senior High School
December 15 - Barboursville
Barboursville Fire Hall
December 16 - Middleburg
Middleburg Community Center
January 12 - Blackstone
Southside Livestock Market

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USING PERFORMANCE AND EPD'S TO SELECT BULLS FOR CALVING EASE AND MILK

by
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Bull selection is, without question, the most important single decision effecting genetics in the herd that a herd owner will make. Bulls used in a herd, whether natural or through A.I., are virtually responsible for all the genetic change that is brought about in the herd unless females are brought in from another herd. There are several issues that the commercial or seedstock producer must face in selecting bulls given that the decision has been made relative to breed. These are:

-Reproductive Soundness: Reproductive soundness is extremely important as it has to do with how quickly a natural service bull can get a group of eligible cows settled. Reproductive soundness requires the ability to serve cows and adequate libido that will cause him to want to get about his work without hesitation. In addition, scrotal circumference or testicle size influences the number of sperm cells produced. Bulls with large testicles have a greater breeding capacity. Soundness of the entire reproductive tract including the penis is real important.

-Structural Soundness: Structural soundness is extremely important in bulls as it relates to the ability of a bull to serve cows. It is also extremely important from the standpoint of longevity both of the bull and of the daughters that he will sire which will be replacements to go back into the herd.

-Growth Rate: Growth rate is extremely important and easily measured with normal performance measures. Growth rate is moderately heritable so progress can be made rather rapidly. All growth traits are genetically correlated to a fairly high degree.

-Calving Ease: Calving ease is extremely important in most beef herds and certainly this is the case because beef herds in general are minimum management units. Calving ease is a very much desired trait that greatly effects the rate of calving difficulty particularly in first calf heifers and has become a much more important issue as we have gotten cattle larger and thus birth weights have increased.

-Maternal Traits: The major maternal trait that we can measure is milk. No herd of beef cattle can operate efficiently without adequate milk. Levels of milk production may not need to be the same in all herds because environmental differences certainly do exist. In selecting bulls, we are concerned with the level of milk production that we can expect in their daughters that will become herd replacements.

-Size: Size is of concern in bull selection as it relates to birth weight, growth rate, and mature size. As we select for more growth rate, we automatically get larger mature size. As we select for growth rate and increase frame size, we increase mature size at a geometric rate. Size is important in cows because of their cost of maintenance. Size is important in

bulls because size of steers and heifers at finished weight should be reasonable and fit market demands. The allowable range on carcass weight is 600 to 800 lbs which translates into live weights on slaughter cattle of 1000 to 1300 lbs.

We have been using performance records in the beef industry for more than 30 years and making significant use of them for 20 years or more. Performance records are excellent for within herd use and have their greatest application there. It is extremely difficult to evaluate animals across herds using performance records because no two farms have exactly the same environment. We can evaluate the trait of growth rate best with performance records. With a combination of performance records and frame size measures, we can change size in cattle. We can use performance records to indicate calving ease but with severe limitations. One of our problems is that we have led commercial producers to believe that they could look at birth weights on young bulls and know what to expect in terms of birth weight on their calves. Birth weight helps slightly but does not give us nearly enough information to make intelligent decisions on birth weight of calves that will be produced as it relates to calving ease.

Performance records have been a powerful tool and will continue to be extremely important. Purebred breeders must weigh calves at birth, at weaning, and at yearling time, take frame scores, measure scrotal circumference, and then report this data to their respective breed association. Performance records coming back to them complete with adjusted weights and ratios are quite useful to evaluate genetic material in their own herd. The commercial bull buyer may rely on this information when selecting bulls from that herd but finds limited usefulness to these records as he goes from herd to herd to evaluate superior animals.

Because the traits of calving ease and milk are so important and because performance records do not very well evaluate these traits, we must rely on expected progeny differences or EPD's.

EPD'S - WHAT THEY ARE

The EPD values are a result of several years of performance testing and recording by purebred breeders, testing that has literally cost the industry several millions of dollars. These testing programs are resulting in significant genetic change within purebred populations of cattle. It is high time for the commercial industry to start capitalizing on these same genetic improvement programs. The only way this will occur is for the commercial bull buyer to understand the concept behind EPD values and how to include them in the criteria used when buying a bull. Transfer of superior and specific genetic performance requires that both bull seller and bull buyer understand what EPD values are, what they are not, and how to use them.

Today, every national beef breed association has a good performance program. National sire evaluation programs started in the early 1970's with the first sire summary being produced by the American Simmental Association in 1972. At that time, national sire evaluations were structured programs. Around 1980, breed associations started using field data in their national sire evaluation programs and today field data is used almost exclusively. EPD's have been found in sire summaries for the major traits of economic importance now for a

number of years. Only in the last few years have programs utilizing what is known as the animal model been utilized making EPD data very comparable both within and across herds of cattle in this country. Until recently, EPD's were only available on bulls and were printed and found in breed sire summaries, and the last two to three years most breed associations have adapted the technology known as national cattle evaluation which allows EPD's to be printed for not only bulls that have progeny but for cows with progeny and for non-parent bulls and females. Today, you will see EPD's on young animals as well as proven animals. These EPD's are quite useful, but we must remember that accuracy of EPD's for the various traits in young non-parent bulls or females is relatively low.

When you compare individual performance records vs. EPD's, you must realize that individual performance records are the only source of data in a performance record. However, in EPD's, the individual performance records are an integral part of the data but also performance evaluation of pedigrees is extremely important. This means that not only the individual young bull's performance record is important, but the record of his sire, his dam, his maternal grandsire, and other collateral relatives in the pedigree have an influence and are accounted for. Progeny performance is extremely important in EPD's on cows or bulls with progeny. Numbers of progeny is what increases accuracy. The performance of daughters is important in determining maternal ability or milk. The individual performance record cannot assess this but this information is extremely important in the computation of EPD's for maternal weaning weight and maternal milk.

EPD's allow comparison of bulls or females for that matter in a breed. By the same token, EPD's are not to be compared between bulls or animals of any kind of different breeds.

The real usefulness of EPD's in the traits of birth weight, weaning weight, yearling weight, and maternal milk is in comparing the difference between two animals. For example, suppose Bull A has an EPD of +35 lbs for 205-day weaning weight, and Bull B of the same breed has an EPD of +10 lbs for the same trait. If these two bulls are mated to a comparable group of cows, the average 205-day weaning weight on calves from Bull A would be 25 lbs heavier than calves from Bull B. The 25 lbs is the difference between the two EPD values (35 - 10 = 25).

Bull	EPD, lb	Average Calf Weaning Weight
A	+35	585
B	+10	560
		—
	difference	25

Every EPD value produced on a bull has an accompanying accuracy value. The accuracy value tells how reliable the EPD value is. Accuracy values range between 0 and 1, least reliable to most reliable. The accuracy value is a

function of the amount of information available when the bull was last evaluated. Sources of information include the bulls on performance records, records on his progeny, and records on relatives. The more information available the higher the accuracy value. The following table can be used as a guide when considering bulls of similar EPD values but differing in accuracy values.

Accuracy Range	Meaning	Considerations
.10 - .30	Low accuracy, little information available	Highest risk*
.40 - .70	Moderate accuracy, evaluated on 10-20 progeny	Moderate to low risk
.70 - .99	High accuracy, bull evaluated on more than 20 progeny	Slight risk

*Risk means level of uncertainty.

The risk considerations of the above table refer to the potential for the bull's EPD values to change given more progeny information. The following table of accuracy values give typical ranges and EPD changes that could occur in Simmental bulls based on the last sire summary. Approximately 67% of all EPD changes will fall within plus or minus the possible change value for a given trait. These are correctly called standard errors of prediction. For example, if Simmental Bull A has a yearling weight EPD of 22.7 lbs with an accuracy of .60 then there is a 67% chance that his next EPD value will not be less than +14.9 lbs (22.7 - 7.8) and not greater than +30.5 lbs (22.7 + 7.8).

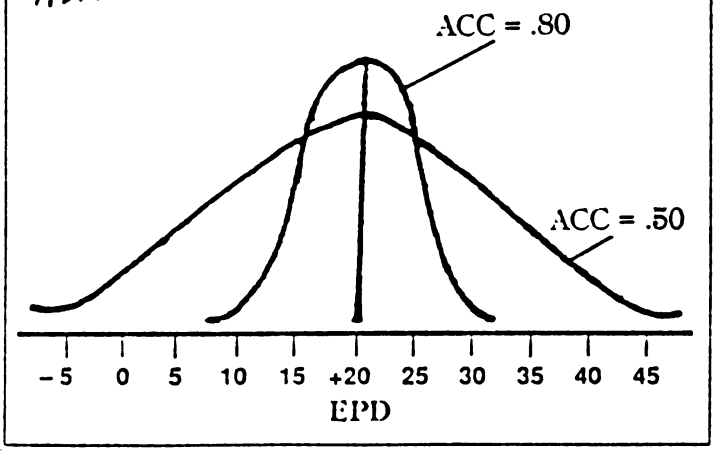
Accuracy and Possible Change (± lb)*

ACC	Birth Weight	Weaning Weight	Yearling Weight	Maternal Milk
0.00	2.3	9.6	19.4	8.7
0.10	2.1	8.6	17.5	7.8
0.20	1.8	7.7	15.5	7.0
0.30	1.6	6.7	13.6	6.1
0.40	1.4	5.8	11.7	5.2
0.50	1.1	4.8	9.7	4.4
0.60	0.9	3.8	7.8	3.5
0.70	0.7	2.9	5.8	2.6
0.80	0.5	1.9	3.9	1.7
0.90	0.2	1.0	1.9	0.9
1.00	0.0	0.0	0.0	0.0

*Source - Simmental 1988 Sire Summary

The following figure simply indicates the change that can take place when more data is available given an accuracy of .80 in one case or .50 in another.

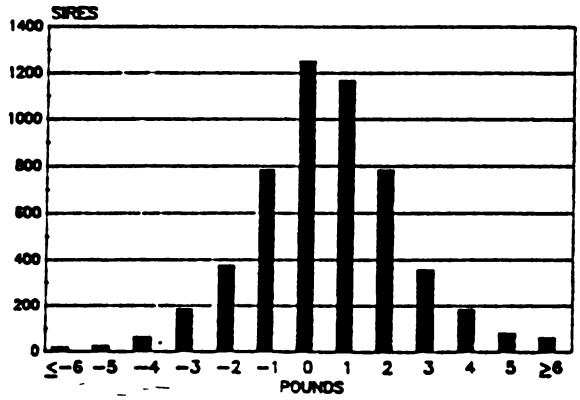
Figure 1
Each bull has a Yearling Weight EPD of 20 lb. The figure relects possible change because of different accuracies.
ASA 88



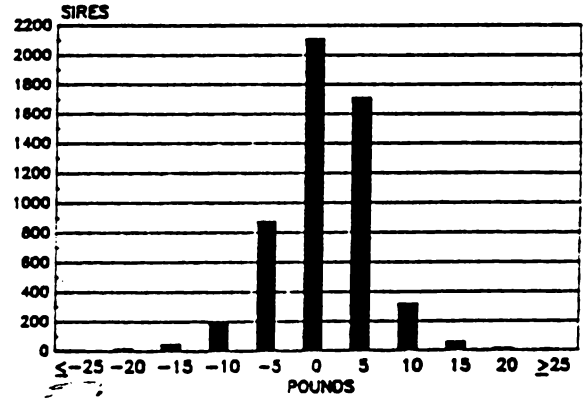
This does not mean in anyway that accuracy is more important than EPD for the trait of interest. It simply means that you should utilize EPD's but realize that if accuracy is not high they are subject to change.

In this discussion, we are interested in birth weight and milk EPD's. The next two tables give you examples of how EPD's are distributed in a breed. In the case of birth weight, if we were interested in selecting bulls with minus EPD's, we would be selecting from the left side of the normal distribution. If on the other hand for the trait of increased milk, we were selecting for more milk we would be selecting bulls with EPD's on the plus side or the right side of the distribution. These distributions come from the 1989 Simmental Sire Summary. We must remember that 2/3's of the bulls evaluated fall within one standard deviation from the mean plus and minus. This explains why there are so few bulls either to the extreme right side or extreme left side of the distribution which is a normal distribution within the breed.

Birth Weight EPDs



Maternal Milk EPDs



EPD's for birth weight are straight forward and easy to understand. The EPD's for maternal milk, however, need some explanation. As breed associations make their calculations, they get an EPD for birth weight direct, weaning weight direct, yearling weight direct, and maternal weaning weight direct. The EPD for maternal weaning weight gives an indication of what a bull's daughters should be but is made up by two components. One is growth rate and the other is the milk that those daughters give. Therefore, to calculate maternal milk it is necessary to take weaning weight direct, divide it by two and subtract the product from maternal weaning weight. The following table show those calculations and the difference in maternal milk on Bull A and Bull B.

Maternal Milk EPD

	Bull A EPD		Bull B EPD	
BW	+2		+1	
WW	+20	X 1/2 = +10	+30	X 1/2 = +15
MWW	+20	= +20	+10	= +10
MM		Diff.= +10		Diff.= - 5
YW	+50		+50	

As we evaluate bulls and, particularly if we are interested in bulls of more than one breed, then we need to be concerned with the fact that the EPD average and the range in EPD's for the various traits may be different and are usually different for the different breeds. The following table points this out quite well as the figures are taken from the latest sire summary on six of our popular beef breeds.

BREED AVERAGE & RANGE - EPD's

	TRAITS			
	BW	WW	MM	YW
ANGUS	+1.2	+4.8	+1.0	+10.6
1988F	-8.8 TO +13.5	-42.7 TO +67.7	-41.2 TO +28.4	-40.8 TO +95.5
HEREFORD	+5	+6.2	+3.0	10.6
1988-89	-6.8 TO +12.2	-6.0 TO +72.0	-20.0 TO +36.0	-11.0 TO +96.0
P. HEREFORD	-.8	+4.1	+15.2	+9.5
1988	-15.4 TO +16.9	-30.0 TO +43.3	-4.0 TO +37.5	-38.0 TO +68.0
SIMMENTAL				
1989	-11.7 TO +9.4	-58.8 TO +49.6	-25.1 TO +24.2	-86.1 TO +76.4
LIMOUSIN	+.34	+4.6	-1.5	+5.5
1988	-5.3 TO +5.9	-17.3 TO +31.1	-23.8 TO +18.5	-23.4 TO +45.0
GELBVIEH	+.3	+3.6	+1.4	+4.8
1988	-9.6 TO +15.2	-44.0 TO +56.2	-22.3 TO +17.4	-49.2 TO +81.2

WHAT EPD'S ARE NOT

First of all EPD values are not an absolute guarantee of how calves from a particular bull are going to perform or daughters are going to milk. First, it must be noted that most beef performance traits are about 20 to 40% heritable. This means that 80 to 60% of all variations seen in calf performance or daughter's performance is environmental in nature. A big component of performance can be due to disease, weather, parasites, nutrition, and management. Second, each calf receives only a sample half of the genes from the bull and a sample half from the cow. Each calf receives a different sample. This is the main reason for differences observed in full sibs or calves that have the same sire and dam.

EPD values are not static. EPD's for any given bull will change. In fact, every registered bull that is currently being evaluated will get a new set of EPD's annually or as often as the breed association runs another genetic evaluation. Recall that EPD's are expectations of how the calves sired by a particular bull will perform. As more information is collected on which to evaluate the bull, EPD values will probably change. Remember too that in the absence of genetic trend within a breed, bulls having EPD's with high accuracy values will change very little while bulls having EPD values with low accuracy values could change considerably. In the presence of positive genetic trend, even the EPD values with high accuracy will decrease from one evaluation to the next. Thus, when you look at old bulls who have maintained high accuracy over a period time, EPD values are generally lower than they once were. When comparing two bulls, look at only the EPD difference. The chances of a bull bought by a commercial cow-calf producer having more than one EPD value are slim to none. So within one year, this bull's EPD value for the various traits will be out of date and will not be totally relevant in making comparisons with the next year's crop of yearling bulls. Many of the bulls bought by commercial cow-calf producers are yearling bulls so these automatically fall into the category of low accuracy bulls. The herd that is large enough to require more than one bull has an advantage over a small herd in minimizing the risk of using an unproven bull.

EPD values are not directly comparable across breeds as was mentioned earlier. This is probably one of the biggest factors that will be source of frustration to commercial bull buyers. A Simmental bull with an EPD of +25 lbs for weaning weight is not directly comparable to a Hereford bull with the same EPD value even if the accuracy is the same. One Simmental bull can only be compared to another Simmental bull, one Hereford bull compared to another Hereford bull, and one Angus bull to another Angus bull.

EPD values are not available on all bulls. Only bulls that are going to have EPD values are those that have been involved in a breed performance program. However, even some purebred herds that participate in their breed program will not have EPD values on yearling bulls due to the fact that the bull did not have his own individual performance record included in the most recent across herd genetic evaluation or that the breed association computes EPD values only for bulls with progeny information or that the bull was an embryo transfer calf. If EPD's are not available for a young bull, then the commercial bull

buyer will need to put together a pedigree estimate sometimes called a pedigree index which will be explained a little further on.

HOW TO USE EPD VALUES

EPD values can be used for traits that fall into four categories:

1. Reproduction as effected by calving ease, birth weight, fertility, and mature cow size.
2. Growth to weaning and post weaning gain.
3. Maternal or milking ability in replacement females.
4. Carcass merit. The task of selecting bulls based on EPD values would be fairly straight forward if you only had to be concerned with one objective. This is seldom the case. You may be interested in calving ease but do not want to sacrifice growth performance or you may want to increase milking level in the cow herd and keep growth and mature size where it is. Not every bull will satisfy all of your criteria and some trade offs will probably have to be made.

An example of the trade offs made by two difference commercial cow-calf producers (A and B) when searching for the next herd bull are summarized in the following three tables. The trade offs and final bull choices are made by matching EPD values with production objectives.

Producer	Objective
A	Minimize calving difficulty in first calf heifers, while maintaining good growth to weaning
B	Increase milking ability in replacement females and post weaning gain in all calves

The following is a list of bulls being considered by the producers to satisfy their breeding objectives.

	EPD Values, lb			
Bull	Birth	Weaning	Yearling	Milk
1	+5.2	+25.4	+45.3	+10.2
2	+1.2	+27.3	+35.6	-3.2
3	+2.3	+18.3	+35.1	+2.3
Breed Average*	+2.3	+26.2	+39.3	+1.5

*Breed average for bulls born the same year as bulls 1,2, and 3.

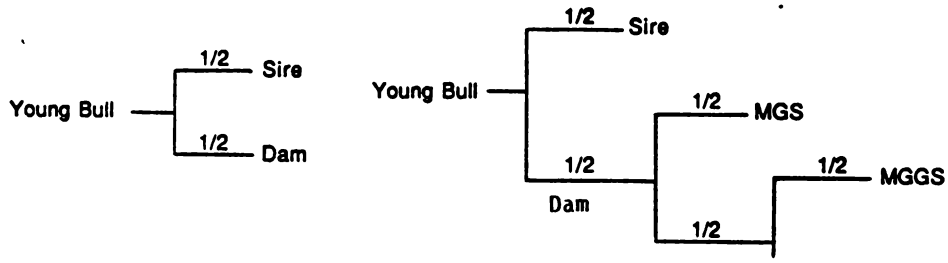
The following table summarizes each producer's bull choice and reasons.

Producer	Choice	Reasons
A	Bull 2	This bull is slightly below his birth year average for birth weight which should minimize the potential for calving difficulties. Bull 2 is just about average for weaning weight which satisfies the objective of maintaining good growth to weaning.
B	Bull 1	Bull 1 is an easy choice for increased milking ability and postweaning gain because he has above average EPD values for both of these traits. However, producer B will only use this bull on mature cows because of the high birth weight EPD.

The steps to follow in preparing to use EPD's may be summarized as follows:

1. Obtain a copy of the most recent sire summary from the breed or breeds of interest. Also, bull books from A.I. studs will be most useful.
2. Determine what your selection goals are before going out to purchase bulls in sales or privately from breeders.
3. Determine what the acceptable range of EPD values are for your herd.
4. Have some idea of the trade offs that you must make.
5. Determine what the average EPD value is for the age category of bull you are buying. You will often hear that the average EPD value is 0 but look at the table above in this text to see what those current averages are.
6. Make sure that you are more knowledgeable on the subject of EPD values than the bull seller.
7. Be able to compute a pedigree estimate EPD for a young bull. Many commercial bull buyers will only be considering young bulls that do not have published available EPD values.
8. Keep track of bull performance in your herd. The track record will make buying the next specification bull a lot easier.

It is quite easy to hand calculate EPD values for birth weight, milk, or any other trait if you have the EPD values on a young bull's sire and his dam or his maternal grandam. Remember that a bull is 50% related to his sire and 50% related to his dam. Also remember that the young bull is 25% related to his maternal grandsire and 12.5% related to his maternal great grandsire. The following schematic vividly points this out and show you how to quickly calculate pedigree estimate or pedigree index from this known data.



The following table lists some examples of pedigree estimated EPDs for a young bull.

Relationship to the Young Bull	Pedigree EPD Values, lb BWT*	WWT	YWT	Milk
Sire	+5.6	+23.2	+38.2	-2.4
Dam	+1.2	-2.3	+2.3	+3.1
MGS	+2.1	-7.3	+1.2	+5.2

Young Bull EPDs:

EPD_{BWT} = 1/2 (5.6) + 1/2 (1.2) = +3.4 lb
or 1/2 (5.6) + 1/4 (2.1) = +3.3 lb

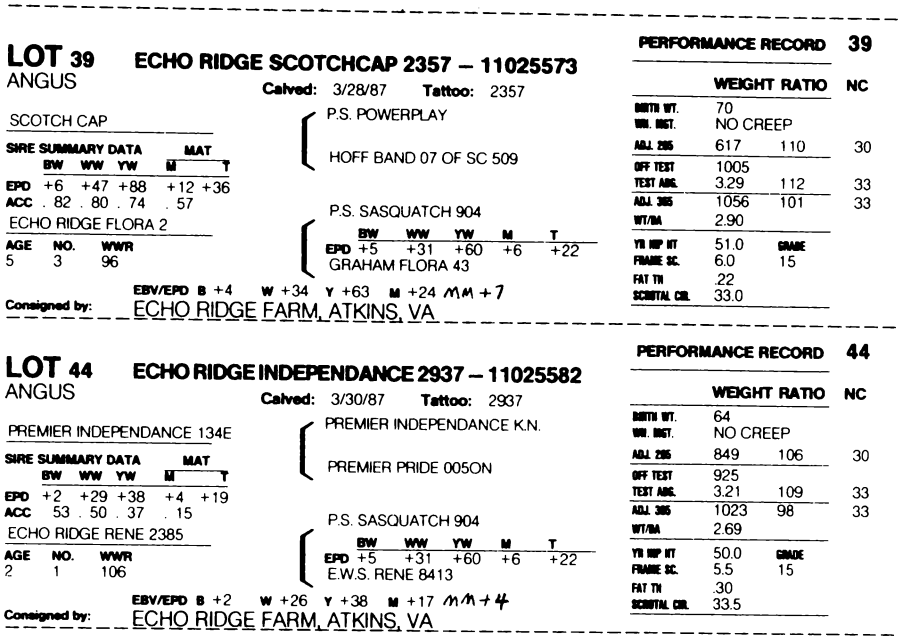
EPD_{WWT} = 1/2 (23.2) + 1/2 (-2.3) = +10.45 lb
or 1/2 (23.2) + 1/4 (-7.3) = +9.79 lb

EPD_{YWT} = 1/2 (38.2) + 1/2 (2.3) = +20.25 lb
or 1/2 (38.2) + 1/4 (1.2) = +19.4 lb

EPD_{Milk} = 1/2 (-2.4) + 1/2 (3.1) = +.35 lb
or 1/2 (-2.4) + 1/4 (5.2) = +.1 lb

*BWT=Birth weight, WWT=weaning, YWT=yearling weight.

Now, let's look at some actual cases from bulls in recent Virginia test station sales. The first two bulls, lots 39 and 44, both show low birth weights which might indicate calving ease. However, there is a difference in these bulls when you look at what their actual EPD for birth weight is. Lot 39 is +4 lbs while lot 44 is +2 lbs. Thus, lot 44 would be a better calving ease risk than lot 39. On this pair of bulls, EPD for milk would be strongly in favor of lot 39 with +8 over lot 44 with +4. Even though when you look at the production record on the dams of these two bulls, it would appear that the dam of lot 44 is stronger with a 106 ratio but only on one calf.



LOT 39 ANGUS — **ECHO RIDGE SCOTCHCAP 2357 – 11025573**
Calved: 3/28/87 Tattoo: 2357

SCOTCH CAP
SIRE SUMMARY DATA — MAT

	BW	WW	YW	M	T
EPD	+6	+47	+88	+12	+36
ACC	.82	.80	.74		.57

ECHO RIDGE FLORA 2

AGE	NO.	WWR
5	3	96

P.S. POWERPLAY
HOFF BAND 07 OF SC 509
P.S. SASQUATCH 904
GRAHAM FLORA 43

	BW	WW	YW	M	T
EPD	+5	+31	+60	+6	+22

EBV/EPD B +4 W +34 Y +63 M +24 MM +7
Consigned by: ECHO RIDGE FARM, ATKINS, VA

PERFORMANCE RECORD 39

	WEIGHT	RATIO	NC
BIRTH WT.	70		
WN. WGT.	NO CREEP		
ADJ. 205	617	110	30
OFF TEST	1005		
TEST ADG.	3.29	112	33
ADJ. 365	1056	101	33
WT/DA	2.90		
YR HIP HT	51.0	GRADE	
FRAME SC.	6.0	15	
FAT TH	.22		
SCROTAL CIR.	33.0		

LOT 44 ANGUS — **ECHO RIDGE INDEPENDANCE 2937 – 11025582**
Calved: 3/30/87 Tattoo: 2937

PREMIER INDEPENDANCE 134E
SIRE SUMMARY DATA — MAT

	BW	WW	YW	M	T
EPD	+2	+29	+38	+4	+19
ACC	53	.50	.37		.15

ECHO RIDGE RENE 2385

AGE	NO.	WWR
2	1	106

PREMIER INDEPENDANCE K.N.
PREMIER PRIDE 005ON
P.S. SASQUATCH 904
E.W.S. RENE 8413

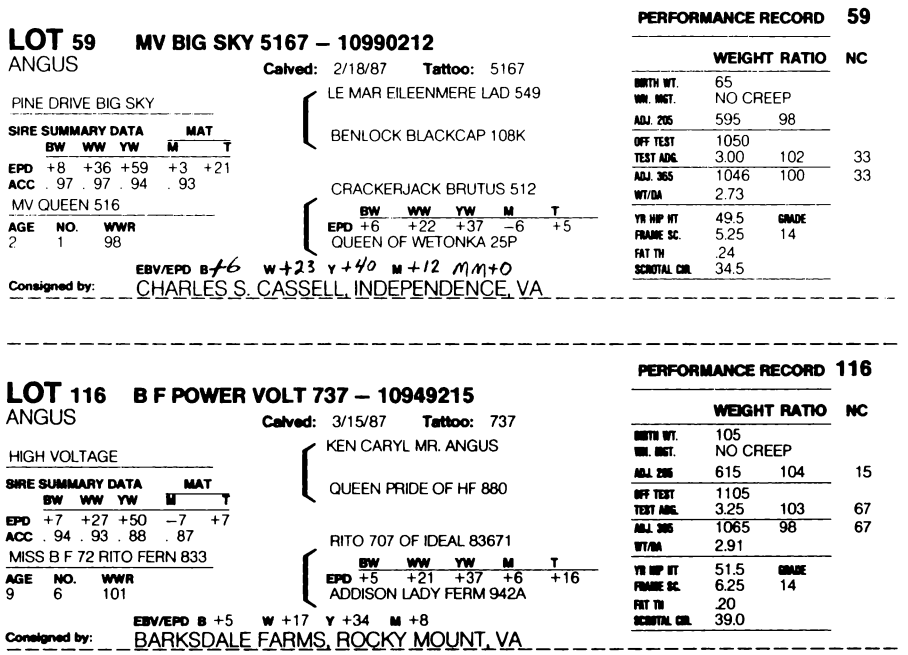
	BW	WW	YW	M	T
EPD	+5	+31	+60	+6	+22

EBV/EPD B +2 W +26 Y +38 M +17 MM +4
Consigned by: ECHO RIDGE FARM, ATKINS, VA

PERFORMANCE RECORD 44

	WEIGHT	RATIO	NC
BIRTH WT.	64		
WN. WGT.	NO CREEP		
ADJ. 205	849	106	30
OFF TEST	925		
TEST ADG.	3.21	109	33
ADJ. 365	1023	98	33
WT/DA	2.69		
YR HIP HT	50.0	GRADE	
FRAME SC.	5.5	15	
FAT TH	.30		
SCROTAL CIR.	33.5		

The next two bulls are interesting from a birth weight standpoint. Lot 116 had a birth weight of 105 lbs. You would immediately say this bull is a cow killer. On the other hand, lot 59 has a birth weight of 65 lbs and you would immediately say he is a calving ease bull. On the birth weight matter, however, if you look at EPD's, lot 116 has a +5 while lot 59 has a +6. This tells me that both of these bulls are useable with no question on mature cows but neither of them is a calving ease bull to be used on first calf heifers.



LOT 59 ANGUS — **MV BIG SKY 5167 – 10990212**
Calved: 2/18/87 Tattoo: 5167

PINE DRIVE BIG SKY
SIRE SUMMARY DATA — MAT

	BW	WW	YW	M	T
EPD	+8	+36	+59	+3	+21
ACC	.97	.97	.94		.93

MV QUEEN 516

AGE	NO.	WWR
2	1	98

LE MAR EILEENMERE LAD 549
BENLOCK BLACKCAP 108K
CRACKERJACK BRUTUS 512
QUEEN OF WETONKA 25P

	BW	WW	YW	M	T
EPD	+6	+22	+37	−6	+5

EBV/EPD B +6 W +23 Y +40 M +12 MM +0
Consigned by: CHARLES S. CASSELL, INDEPENDENCE, VA

PERFORMANCE RECORD 59

	WEIGHT	RATIO	NC
BIRTH WT.	65		
WN. WGT.	NO CREEP		
ADJ. 205	595	98	
OFF TEST	1050		
TEST ADG.	3.00	102	33
ADJ. 365	1046	100	33
WT/DA	2.73		
YR HIP HT	49.5	GRADE	
FRAME SC.	5.25	14	
FAT TH	.24		
SCROTAL CIR.	34.5		

LOT 116 ANGUS — **B F POWER VOLT 737 – 10949215**
Calved: 3/15/87 Tattoo: 737

HIGH VOLTAGE
SIRE SUMMARY DATA — MAT

	BW	WW	YW	M	T
EPD	+7	+27	+50	−7	+7
ACC	.94	.93	.88		.87

MISS B F 72 RITO FERN 833

AGE	NO.	WWR
9	6	101

KEN CARYL MR. ANGUS
QUEEN PRIDE OF HF 880
RITO 707 OF IDEAL 83671
ADDISON LADY FERM 942A

	BW	WW	YW	M	T
EPD	+5	+21	+37	+6	+16

EBV/EPD B +5 W +17 Y +34 M +8
Consigned by: BARKSDALE FARMS, ROCKY MOUNT, VA

PERFORMANCE RECORD 116

	WEIGHT	RATIO	NC
BIRTH WT.	105		
WN. WGT.	NO CREEP		
ADJ. 205	615	104	15
OFF TEST	1105		
TEST ADG.	3.25	103	67
ADJ. 365	1065	98	67
WT/DA	2.91		
YR HIP HT	51.5	GRADE	
FRAME SC.	6.25	14	
FAT TH	.20		
SCROTAL CIR.	39.0		

There is no question but what EPD's give us a much needed tool as we select for the traits of birth weight and milk. For that matter, EPD's are extremely useful for the growth traits as well. Don't fail to use performance records but remember that EPD's are a much better measure of true genetics.

DEVELOPING AND BREEDING REPLACEMENT HEIFERS FOR CALVING EASE AND MAX REPRODUCTION

Dr. W. D. Whittier, Extension Veterinarian, Cattle
Virginia-Maryland Regional College of Veterinary Medicine

Preventing losses when calving heifers is a challenge for any cattleman. In some instances very high death losses of calves, and sometimes heifers, result in great financial losses. Steps can be taken both at calving time and as much as a year before calving to minimize these losses and make the job easier. Studies have indicated that on the average about 30% of heifers will need some assistance at calving. The two most common reasons for assistance are difficult calvings and mismothering.

Preventing Losses at Calving Time

Even with the best of management considerable assistance must be given at calving time. Surveillance for problems will be important to the successful heifer calving routine. In general, heifers will need to be checked at least three times a day for difficulties. Facilities which are set up so that individuals having trouble can easily be isolated and examined or assisted will be important. This includes having some pens that can be kept dry and clean where heifers can be put after difficult calvings or when a heifer refuses to own a calf.

Preventing losses from calving difficulties becomes a major challenge. In general, heifers will require longer in calving than will cows; however, after heifers have entered the straining stage of labor, no more than two hours should be allowed before examination and assistance is given. Having clean, adequate equipment including calving chains and handles is recommended. As a rule of thumb, the amount of effort that three strong assistants can deliver should be sufficient to deliver any calf. If this amount of pulling is not successful a veterinarian should be consulted. C-sections are useful in preventing losses of both calves and dams and will be much more successful if performed early before a heavily contaminated uterus, a dead calf, or a damaged/weak cow are in hand.

Mismothering is also a common problem with first calving heifers. This can be aided by disturbing the heifer as little as possible and by providing an area where the heifer will be somewhat restrained and not disturbed. If mismothering does occur, provision of colostrum for the calf becomes a real issue. In general, if getting the heifer to own the calf is a problem, an early step should be providing the calf with 5% of its body weight in colostrum.

Prevention of Calving Difficulties

Prevention of calving difficulties can basically be fit into two categories. These follow from the fact that the two biggest contributors to calving difficulty are 1) size and shape of the calf, and 2) size of the dam.

Size and conformation of the calf is most importantly determined by selection of the sire. Breed selection is an important consideration, however, some of our past assumptions about breed and calving ease need to be reconsidered. Some individuals in the British breeds (traditionally considered to be easy calvers) are now considerably larger cattle and capable of siring calves with birth weights as large as exotics. The mature weight of the sire which is used will be an important determinant of the size of offspring which result from the mating. The sire's birth weight should be considered, but is only one determinant of the size of offspring. Artificial insemination of heifers may be an attractive alternative since AI sires are now available which have been progeny-tested for small calf birth weights.

Estrus synchronization programs may have some real applicability at the time that replacement heifers are bred whether or not artificial insemination is used. With natural service synchronization programs can provide for a large portion

of heifers calving within a short period of time. This will allow for a shorter time of surveillance for calving difficulties and allow better utilization of labor in many cases.

Heifer Size and Calving Difficulty

The second major determinant of calving difficulty is heifer (dam) size. Basically heifer size is determined by genetics and nutritional management. Nutritional management can be examined in two phases. Phase I is the period from weaning to breeding, ideally occurring at 12-15 months of age. Phase II is the period from breeding to calving at approximately two years of age.

Management of Phase I heifer growing from weaning to breeding time is extremely important. The productivity of a first calf heifer has been demonstrated by research to be influenced by nutritional management during this time. Heifers which are poorly developed will experience more calving difficulty, milk less, wean lighter calves, and have more difficulty in rebreeding.

In a Kansas State University trial one group of heifers was wintered to reach a target of 65% of potential mature weight by the time of first breeding. The second group was wintered to achieve only 55% of their mature weight. Mature weight was determined by utilizing frame measurements and then projecting a mature weight. Following the wintering period heifers were grazed together and wintered the second winter as a single group and fed the same until they calved at two years of age. Those heifers that were initially fed higher energy rations so that they achieved 65% of their mature body weight by breeding time experienced considerably less difficulty when compared to heifers wintered at a lower plane of nutrition. Larger heifers had 28.8% calving difficulty as compared to 52.3% calving difficulty with heifers which had only reached 55% of their mature body weight by breeding time.

The second phase of feeding with considerable importance is the period from breeding to calving. Of particular interest is the last several months of gestation when considerable fetal growth occurs. Most studies have surprisingly failed to show a very large difference in calf weight between extremes in heifer feeding. Differences of 5-11 pounds are the maximum differences that have been shown between underfed heifers and heifers that were considerably overfed. Even when calf birth weights between low energy and high energy diet heifers were as high as 11 pounds, heifers which were fed higher energy diets were less likely to have calving difficulties.

In a New Zealand study, heifers fed lower energy diets weaned calves which were 37 pounds lighter than calves of cows fed low energy rations. Calf mortality was considerably greater in heifers fed less energy resulting in these cows weaning only a 75.4% calf crop as compared to a 93.4% calf crop for heifers fed higher energy rations.

Clay Center Nebraska Meat Animal Research Center data indicated increases in birth weights from 57.8 pounds to only 63.7 pounds for low and high level energy diets. In this study calving difficulty remained fairly similar between groups.

In summary, energy restriction prior to calving will reduce birth weight only slightly without an increase in calving difficulty or decrease in calf mortality. On the negative side, energy reduction will lengthen the interval from calving to first heat, will reduce milk production, and will reduce subsequent calf weaning weights.

With the strengthening of the cattle market there may be an impetus to produce quality replacement heifers. By applying proper principles cattlemen can produce high quality replacement heifers without excessive death loss of calves or dams.

CURRENT BACKGROUNDING ECONOMICS

by Jack Dunford
Extension Agent, Farm Management
Culpeper, VA

The information in this report is based on current feeder cattle prices and floor prices that could have been set using the Forward Pricing Institute on November 1, 1988 in the Culpeper-Orange-Madison area.

Backgrounding Light Cattle the Winter of '88:

Feeder cattle prices are high this fall and early winter for all weights of feeders. To minimize risk one should consider moving the heavier feeders this fall and using the funds to purchase lighter cattle. If they're raised cattle, the same line of thinking certainly holds true - background the light cattle and market the heavier end if the feed resources are available. You might have $350-400 per head tied up in four-weight calves while the investment could be $600-700 per head for the heavy weights!

Even with the best of management, good-doing calves, and some luck it will be difficult to net large returns by backgrounding cattle this winter to market in the spring. The combination of high calf prices, high purchased feed prices (corn and protein) and in many cases, poorer quality roughage are real obstacles to overcome.

In my mind, effective marketing will be critical in making a "hold-sell" decision in November-December, 1988. The Forward Pricing Institute is a new marketing tool that should be considered in off-setting some of the marketing risk associated with these expensive feeders. If you have cattle on hand this fall you should consider using the Institute to set a "floor" price for the cattle to be sold in the spring of 1989.

How Do You Manage Feeders this Winter?

Normally when feeders are expensive and the market price involves some uncertainty, it pays to push the calves fairly hard to turn a dollar. Table 1 summarizes seven rations that I chose to evaluate in predicting average daily gain (ADG), feed cost and ultimately, profit or loss. The feed prices used in calculating the ration costs are shown at the bottom of Table 1. Without going into a lot of detail, lets focus on the cost/CWT gain for the various rations. At one extreme, 4-weight cattle wintered on hay to gain less than a pound per day will have a feed cost of about $54/CWT of gain, while the same cattle, fed rations to support a 2.0 or better ADG will have a cost/CWT of gain in the $26-27 range. As you review the table you can see it may make

sense to feed expensive purchased feeds to increase gains and reduce feed costs per unit of gain. But it <u>really</u> makes sense to use an economical product like poultry litter that we can have delivered to our area for $15-20/ton. Rations #6 and #7 are workable alternatives utilizing poultry litter which is similar to alfalfa hay in nutrient levels.

TABLE 1

Alternative Rations and Expected Performance
Beg. Wt. 400 lbs. - On Feed 150 days

Alt.	Ration	ADG	Total Gain	Total Feed Cost	Feed Cost/ CWT Gain
1	12.50# mixed hay	0.75 lbs.	113 lbs.	$60.94	$53.93
2	11.33# mixed hay 3.00# corn	1.25 lbs.	188 lbs.	$79.34	$42.20
3	34# corn silage	1.50 lbs.	225 lbs.	$76.50	$34.00
4	35.33# corn silage 1.00# 50% supp.	1.75 lbs.	263 lbs.	$98.99	$37.64
5	34.00# corn silage 2.00# poultry litter	1.75 lbs.	263 lbs.	$79.20	$30.11
6	31.50# corn silage 1.00# shelled corn 2.00# poultry litter	2.00 lbs.	300 lbs.	$81.61	$27.20
7	5.25# mixed hay 5.75# corn 5.75# litter	2.00 lbs.	300 lbs.	$79.55	$26.52

Corn Silage - $30/ton
Hay - $65/ton
Litter - $18/ton
50% Supplement - $260/ton
Corn - $3/ton

Table 2 is an estimate of the non-feed costs associated with owning a feeder steer for 150 days this winter. Of course, if you raised the steer you can eliminate the delivery charge and possibly the interest charge. But I would encourage you to charge interest on home-raised steers since you could have sold the steer this fall and paid off a debt or invested the proceeds in a financial instrument. Some of you might market your cattle directly off the farm which would reduce your hauling and

marketing charge. But for the sake of demonstration, lets include all these variable non-feed costs which amounts to about $438 per head.

TABLE 2

Non-Feed Variable Costs

Purchase Steer	$392.00
Deliver to Farm	3.75
Vet, Med, TM Salt, Implants	4.74
Supplies, Maint., Ins.	4.51
Haul and Market	16.54
Int. on Feeders (150 days)	16.11
Variable Non-Feed Cost	$437.65

Putting the Numbers Together

Table 3 simply combines the feed and non-feed costs to arrive at a total variable cost for each feeding system. That total divided by the estimated selling weight in 150 days gives you the total cost per hundred weight marketed. In reality this is the "break-even" price/CWT that you must have to pay all your variable costs. There is a wide range of "break-even" prices- $97.19 to $73.89 for that same 400 pound steer that was fed different rations as outlined in Table 3.

TABLE 3

Cost of Alternative Wintering Systems

1. Hay	Non-Feed Costs	$437.65	Sell Wt.	513 lbs.
	Feed Costs	60.94	Total Cost/CWT	$97.19
	Total Variable Costs	$498.59		
2. Hay Corn	Non-Feed Costs	$437.65	Sell Wt.	588 lbs.
	Feed Costs	79.34	Total Cost/CWT	$87.92
	Total Variable Costs	$516.99		
3. Silage	Non-Feed Costs	$437.65	Sell Wt.	625 lbs.
	Feed Costs	76.50	Total Cost/CWT	$82.25
	Total Variable Costs	$514.15		

4. Silage	Non-Feed Costs	$437.65	Sell Wt.	663 lbs.
50% Supp.	Feed Costs	98.99	Total Cost/CWT	$80.94
	Total Variable Costs	$536.64		
5. Silage	Non-Feed Costs	$437.65	Sell Wt.	663 lbs.
Litter	Feed Costs	79.20	Total Cost/CWT	$77.96
	Total Variable Costs	$516.85		
6. Silage	Non-Feed Costs	$437.65	Sell Wt.	700 lbs.
Corn	Feed Costs	81.61	Total Cost/CWT	$74.18
Litter	Total Variable Costs	$519.26		
7. Hay	Non-Feed Costs	$437.65	Sell Wt.	700 lbs.
Corn	Feed Costs	79.55	Total Cost/CWT	$73.89
Litter	Total Variable Costs	$517.20		

Now Let's Market That Steer

Any feeder cattle producer who has ten head or more of cattle that are similar weight, grade, and sex can use the Forward Pricing Institute to set a floor price for spring delivery to an approved state-graded feeder cattle sale. Table 4 indicates what one could have done on November 1, 1988 to set floor prices for the various weight steers that will be produced on the various feeding systems. The second column indicates the appropriate basis for each weight steer. Basis is defined as cash price-futures price. For instance, for the last several years a 700 pound black-baldy steer sold at Culpeper in early April has averaged $4.70 more/CWT than the closing futures price on the same dates. On November 1, 1988 you could have set a floor price using a $78 strike price with a premium of $1.90/CWT and a Pricing Institute fee of $1.00/CWT. The third column of Table 4 simply adds the basis number to the $78 strike price to arrive at the floor price. The last column is really the net price you'll enjoy after paying the $2.90 cost/CWT for setting the floor price. The beauty of this pricing mechanism is that if prices do work higher in April 1989, you reap the benefit of this price increase with no change in the cost of doing business with the Pricing Institute. There are no futures brokers or margin calls to deal with; you buy the "price insurance", pay the premium and sleep well at nights.

TABLE 4

Culpeper
Feeder Cattle Basis and Floor Price
Set on November 1, 1988 for Early April, 1989
M-1 BWF Steer

WT	Basis	Floor Price Using $78 Strike	*Cost/CWT	Net Floor Price/CWT
700 lb.	+4.70	$82.70	$2.90	$79.80
660 lb.	+6.42	$84.42	$2.90	$81.52
625 lb.	+7.93	$85.93	$2.90	$83.03
590 lb.	+9.43	$87.43	$2.90	$84.53
510 lb.	+12.87	$90.87	$2.90	$87.97

* $1.90/CWT - cost of Put Option
$1.00/CWT - Pricing Institute Fee

How Does It All Come Out in the Wash?

Table 5 shows the bottom line for each alternative if you're willing to use the Institute. Feeding these cattle to gain 1.25 pounds per day or less doesn't look good - if you agree with all the assumptions made at this point. You could stand to lose $30-50 per head based on what the market was offering on November 1. Feeding the cattle to gain around 1.50-1.75 pounds per day doesn't get you very far either. You'll "trade" dollars at this level of performance and the associated feed costs. If you can put two pounds or better of daily gain on these cattle you can generate $25-30 of return per head to cover labor, management, fixed costs, and risk. If you already own the cattle, forget about the interest charge and market them directly off the farm you may improve your returns some. But remember, to use this particular pricing mechanism you must work through a graded sale to guarantee the floor. However, the Institute has just initiated a new contract so you can price cattle to be sold at the farm (telo-auction, order buyers, satellite auction, etc.). This new contract is available all through the year for feeder and finished cattle.

TABLE 5

Gain (Loss) by Forward Pricing
Steers at Culpeper, VA - Early April, 1989
(2-1/2% Death Loss Included)

Alternative	Floor Price Set/HD	Cost of Prod/HD	*Net/Head
1. Hay	$439.57	$498.59	(59.09)
2. Hay & Corn	$484.20	$516.99	(32.79)
3. Silage	$505.96	$514.15	(8.19)
4. Silage & 50% Supp.	$526.57	$536.64	(10.07)
5. Silage & Litter	$526.57	$516.85	$9.72
6. Silage & Corn & Litter	$544.64	$519.26	$25.38
7. Hay & Corn & Litter	$544.64	$517.20	$27.44

* Return to cover labor, management, fixed costs and risk

It May Pay to Shop Around

Another attribute of the Forward Pricing Institute Basis Tables is that you can compare markets, where feasible, to find the best price. Table 6 will likely cause me some troubles with certain market operators, but here goes. Listed are the floor prices you could have set on November 1, 1988 for M-1 BWF Steers, L & M Simmental X Steers, and M-1 Hereford Heifers to be sold in early April at four graded sales in our area. Without calling names it's quite obvious where you ought to market your BWF cattle if your farm is a similar distance from the competitive markets. There are two markets you ought to consider for the cross steers as well as for the Hereford heifers. But notice no individual market has the highest basis for every type of feeder animal. Also as more price information becomes available these basis figures may change. Be sure you have current basis information before you begin making these sorts of decisions. Call Mr. Mike McDaniel at (703) 953-1711 for more information concerning forward pricing your feeder cattle and for the latest basis information.

TABLE 6

CWT Floor Prices Set for Beef Steers by Market on November 1, 1988 Delivery in Early April, 1989

M-1 BWF Steers

Expected WT	Culpeper	Harrisonburg	Fredericksburg	Charlottesville
700	$79.80	$76.97	$75.88	$75.15
660	$81.52	$78.53	$76.88	$77.03
625	$83.03	$79.90	$77.72	$78.68
590	$84.53	$81.26	$78.56	$80.32
510	$87.97	$84.38	$80.48	$84.08

L & M Simmental X Steers

Expected WT	Culpeper	Harrisonburg	Fredericksburg	Charlottesville
700	$78.43	$78.41	$73.31	$73.21
660	$80.15	$79.97	$74.31	$75.09
625	$81.66	$81.34	$75.15	$76.74
590	$83.16	$82.70	$75.99	$78.38
510	$86.60	$85.82	$77.91	$82.14

M-1 Hereford Heifers

Expected WT	Culpeper	Harrisonburg	Fredericksburg	Charlottesville
700	$62.12	$69.98	$69.61	$60.41
660	$62.48	$70.54	$69.81	$61.01
625	$62.79	$71.03	$69.98	$61.53
590	$63.11	$71.52	$70.16	$62.06
510	$63.83	$72.64	$70.56	$63.26

In Summary

Buy right, feed for performance, control feed costs and market intelligently.

CURRENT BACKGROUNDING ECONOMICS

Bill R. McKinnon
Extension Agent, Farm Management

Pro Beef Profit Clinics
Dublin, Dec.6; Lexington, Dec.7; Lynchburg, Dec. 8, 1988

The current higher prices being received by all segments of the cattle industry are felt to be long overdue by most and have created a general atmosphere of excitement among Virginia folks in the cattle business. The cow/calf producer, backgrounder or stocker, and cattle feeder have all received higher prices for their cattle during 1988. We have several factors driving prices higher such perhaps a bottoming out of beef demand, but the basic force pushing prices is shrinking cattle numbers in the country.

Times have been tough for a long time, particularly for the cow/calf producer. We have seen a protracted decline in the numbers of brood cows, the basic production unit of the beef industry. Fewer cows in the country mean fewer calves being produced each year. The industry has basically a fixed number of backgrounders, stocker operators, cattle feeders, and packers chasing a reduced of cattle through which to market their feed, labor, and other resources. For the individual operator to get cattle to keep his enterprise operation going he is forced to pay more for the cattle to bid them away from his competition, other producers.

Now, most everyone likes higher prices when he sells his cattle, but there comes a day of reckoning. Excluding the cow/calf business, replacement cattle must be purchased if the operation is to continue to process and hopefully add value to cattle. Higher sale prices mean higher purchase prices. Backgrounding and stocker operators operate on a margin. There is margin between the price they receive for cattle and the price they pay for their cattle. If their cost of adding value to the cattle is less than their margin, they make money. It is obvious that the backgrounder must be aware of the margin on the cattle with which he is working.

As kind of a shorthand method of keeping up with their margin, some producers worry only about the difference in the dollars per hundredweight that they get paid for their cattle versus the price they orginally paid for the cattle. Some folks get comfortable operating on set margin (usually negative) between what they pay per pound for their cattle and what they receive for them six or twelve months later. When the general price level for cattle changes so do the price margins that various enterprises can tolerate and still show a return. Figure 1. illustrates that a program that can operate on a negative $2 per cwt. margin at a $70 price level can still break-even with a negative $7 per cwt. margin at a $90 price level.

Figure 1.

MARGIN ON WINTERING CALVES

450 Lb. Steer	@$70.00 =	$315.00	450 Lb. Steer	@$90.00 =	$405.00
Feed		$84.00	Feed		$84.00
Other Operating Costs		$39.00	Other Operating Cost		$39.00
Operating Interest		$24.00	Operating Interest		$32.00
2% Death Loss		$6.00	2% Death Loss		$8.00
Marketing & Hauling		$10.00	Marketing & Hauling		$10.00
		$478.00			$578.00
Breakeven price on 700 lb. steer		$68	Breakeven price on 700 lb. steer		$83
Price Margin	=	($2)	Price Margin	=	($7)

Figure 1. demonstrates that at a higher price level the pounds put on the cattle by the producer are sold at a higher price and therefore there are more total dollars available to pay for costs that do not change with cattle price level such as feed, vet.and medicine, etc.

Figure 1. also illustrates perhaps some old rules of thumb or relationships with which we had become comfortable at lower prices may not hold true with current prices. It reinforces the fact that cattle producers and particularly those working on the margin need to do some careful pencil pushing in their operations to be successful. During the next few years it will be most important for backgrounders to do two things. Task one is to have a good handle on costs of production and carefully calculate a breakeven selling price for cattle at the time of purchase and throughout the production cycle. Knowing his breakeven sale price allows the producer to consider item two; that is whether or not to seek price risk protection for his cattle. Price risk protection can be obtained through the futures market directly or through an intermediary such as Forward Pricing, Inc. At the price levels at which cattle are currently trading price protection becomes more important because more is invested in the cattle and they have farther to fall.

Figure 2. summarizes the projected costs and returns to some wintering or backgrounding programs applicable for steer calves in Virginia. The return or loss is the return to labor, management, and fixed costs as no charge has been made for these items since they vary so widely from farm to farm.

Figure 2.

FALL TO SPRING BACKGROUNDING PROGRAMS

START WITH 450 LB STEER CALF @ $90/cwt

WINTER FEEDING PROGRAM	180 DAY GAIN	SALE WEIGHT	BREAKEVEN PRICE	PROJECTED PRICE	PROJECTED RETURN/LOSS
Hay	125	575	$92.50	$95.00	$14.38
Hay + 1% Corn	220	670	$89.00	$85.50	($23.45)
Stockpiled Fescue + Hay	135	585	$87.50	$94.00	$38.03
Stockpiled Fescue + Hay + .5% Corn	175	625	$87.00	$88.00	$6.25
Corn Silage + Protein Supplement(SBOM)	250	700	$81.75	$84.00	$15.75
Corn Silage + Protein Supp.(SBOM) + 1% Corn	350	800	$77.25	$79.50	$18.00
Corn Silage + Litter	220	670	$79.50	$85.50	$40.20
Corn Silage + Litter + 1% Corn	325	775	$76.75	$80.50	$29.06

* .5% or 1% corn means as a percent of calf body weight

Assumptions:

Hay	$60.00 /ton
Corn silage	$20.00 /ton
Soybean meal	$300.00 /ton
Broiler litter	$20.00 /ton
Corn (rolled)	$4.25 /bu.
Stockpiled fescue	$30.00 /ac.
Pasture (30 days)	$3.00 /hd./mo.

Projected sale price assumes a $82/cwt. futures plus average basis adjustments for special feeder cattle sales held at Dublin, Lynchburg, Narrows, Roanoke, and Staunton.

Other Variable Wintering Costs Per Head

Procurement	$3.00
Vet. & medicine	$5.00
Salt, min., ionophore	$6.00
Fence/facility repair	$3.00-$4.50
Equip. fuel & repair	$6.00-$20.00
Interest	11.00%
Death loss	2.00%
Marketing & hauling	$10.00

The projected returns indicated in Figure 2. seem to suggest limited financial rewards for wintering calves in Virginia during the '88-'89 season. This is given the current market situation and the futures projections for next spring. It should also be remembered that these estimations were based on a $90/cwt. 450 lb. steer calf. During some periods this fall these calves could not be purchased for this price. In most cases the cow/calf producer considering wintering his own calves could have netted much more than $90/cwt. for this weight calf this fall through his local special feeder calf sales.

Those winter backgrounding programs which appear to have the most potential are those which incorporate a relatively cheap feed such as stockpiled fescue or broiler litter. The use of broiler litter incorperated with corn silage may give the beef producer his best means of marketing his corn silage.

This table also suggests that this fall's higher corn prices limit additional corn's usefulness in wintering programs. The extra pounds gained with the addition of corn to the ration barely will offset the cost of the corn. Now, this holds true for rolled corn purchased from the local mill. For the producer owning his own corn, adding corn to the ration will most be likely a paying proposition.

In actuality, a great number of calves wintered in Virginia stay in the hands of the same backgrounder through the following grazing season. This is particularly true of calves wintered to put on less than 200 pounds of gain. Figure 3. tries to project the returns to calves purchased or retained this fall and owned until the fall of 1989. This certainly calls for a lot use of the old crystal ball to project prices next fall. For our purposes, a feeder cattle futures price of $79/cwt. will be used as a base for predicting next fall's prices.

The numbers in Figure 3. show as might be expected improved returns to holding cattle through the grazing season. Over the long run, grazing yearling cattle in western Virginia has been a profitable enterprise. Also, as might be expected, those wintering rations which put on the cheapest winter gains when linked with a grazing period show the best returns of those programs listed in the table. Figure 3. also shows some programs to offer very limited returns for owning cattle for nearly a year.

Some of the reason for limited increased return by grazing some of these wintered cattle is the heavy final sale produced by the particular feeding program. Heavier feeder cattle usually suffer a substantial per pound price discount, particularly for those cattle weighing over 900 pounds. The feeder must discount these heavier cattle because his per head hauling charge is higher and he has fewer pounds left to put on the steer or heifer with which to cover his fixed per head costs.

Figure 3.

FALL TO FALL BACKGROUNDING PROGRAMS

START WITH 450 LB STEER CALF @ $90/cwt.

WINTER FEEDING PROGRAM	335 DAY GAIN	SALE WEIGHT	BREAKEVEN PRICE	PROJECTED PRICE	PROJECTED RETURN/LOSS
Hay	425	875	$70.00	$75.25	$45.94
Hay + .5% Corn	470	920	$70.00	$73.00	$27.60
Stockpiled Fescue + Hay	435	885	$67.00	$75.00	$70.80
Stockpiled Fescue + Hay + .5% Corn	475	925	$68.00	$73.00	$46.25
Corn Silage + Protein Supplement(SBOM)	550	1000	$66.00	$69.00	$30.00
Corn Silage + Litter	520	970	$63.50	$70.00	$63.05

* .5% corn means as a percent of calf body weight during the wintering period only

Assumptions:

Feed costs for the wintering phase are the same as those used in Figure 2.
After wintering phase steers are grazed on permanent pasture.
Pasture gain - 300 lb per head
Projected sale price assumes a $79/cwt. futures plus average basis adjustments for special feeder cattle sales held at Dublin, Lynchburg, Narrows, Roanoke, and Staunton

Other Variable Production Costs per Head

Procurement	$3.00
Vet. & medicine	$8.00
Fly control	$1.50
Salt, min., ionophore	$12.00
Fence/facility repair	$5.50-$7.00
Equip. fuel & repair	$8.00-$17.00
Pasture	$3.00 /mo.
Interest	11.00%
Death loss	2.50%
Marketing & hauling	$13.00

Many producers who winter calves on higher energy rations such as corn silage and put on better than 200 pounds of gain may be better off financially to sell those wintered calves in the spring. If the producer still needs cattle to graze he may simply be better off to go into the spring market and buy his grazing cattle. The projections made in Figure 3. assumed that all the cattle grazed would put on an additional 300 pounds during the grazing season. This figure may be a fair gain for our better producers grazing lighter weight steers. For the heavier weight steers wintered at a higher energy level, 300 pounds of summer gain becomes questionable. Reduce the summer gain below 300 pounds and the returns to grazing those heavier get more marginal.

Figure 4. illustrates the diference in the returns between grazing a spring purchased 450 pound steer versus a raised 750 pound yearling. The purchase price for the light steer is a weighted average for that weight steers sold in statewide special feeder cattle sale held in the spring of 1988. The "purchase price" of the 750 pound steer was the opportunity cost that a producer had since he could have sold the steer in the spring also in the special feeder cattle sales.

More and more of the better cow/calf producers who keep their own calves for another year are being confronted with this heavy yearling steer problem more often. Many of these producers have been successful at wintering and then grazing their own calves for many years. For years these operators produced a product at a weight acceptable to the feeding industry. With the use of better genetics, implants, ionophores, and other new technology, many of these progressive cattlemen have now increased the weight on their yearlings by 100 to 200 pounds. Now these producers have found their yearlings outside of the market mainstream. They are proud, and rightfully so, of the 950 to 1100 pound yearling they have produced. They have a smile on their face when the cattle are weighed in, but that night when the cattle are sold, the find that they have been paid little for their extra pounds and effort.

The key to this progressive cattlemen being paid for his use of improved technology and genetics is timing. The producer needs to time the sale of his cattle to optimize his returns. This requires some serious pencil pushing and time spent analyzing the market and the producer's resources at hand. In some time periods it may be best to hold calves another ten to twelve. In other times the return to the farm resoures may be optimized by backgrounding calves through the winter only or maybe only through a shortened backgrounding period. At other times and perhaps now is one of them, those growthy calves should be sold directly off the cow. One thing is certain. One program will not always be the best for every producer in every year.

Figure 4.

RETURNS FOR GRAZING HEAVY
VERSUS LIGHT STEERS

EXPENSES					
Purchase Weight			750 LB		450 LB
Purchase Price			$80.50		$107.00
Stocker Steer			603.75		481.50
Other Cash Costs:					
Procurement			$0.00		$3.00
Vet. & Medicine			$4.00		$4.00
Fly Control			$1.50		$1.50
Salt/Min/Rumensin			$6.00		$6.00
Fence & Fac. Repair			$2.50		$2.50
Equip. Fuel & Repair			$2.00		$2.00
Pasture	1.90 AC	@$20.00	$38.00	1.5 AC	$30.00
Subtotal			$657.75		$530.50
Interest.	11.00 % for 6.0 mo.		$36.18		$29.18
Death loss	0.50%		$3.02	1.00%	$4.82
Mktg. & Hauling			$13.00		$10.00
Total Cash Expenses			$709.95		$574.49
Market Weight			1050 LB		750 LB
Market Price			$67.00		$81.50
Total Income			$703.50		$611.25
Net Return Per Head			($6.45)		$36.76

As referred to earlier in this discussion, the summer grazing of yearling cattle in western Virginia continues to be a profitable enterprise in the long run for the better producers. This enterprise continues to be an effective method to market grass. Figure 5. expresses projected returns to this program when grazing spring purchased 450 pound steers, 550 pound steers, and 450 pound heifers. As earlier assumed, an $82/cwt. spring futures and a $79/cwt. fall futures price was used for projection purposes with appropriate basis adjustments made. In most cases, unless cattle are purchased at extreme highs or gains are on the low side the producer nets a positive return to his labor, management, and fixed resources.

Some may argue with the use of the futures market as a price predictor. Long term studies indicate that the futures is as reliable as any tool or human prognosticator we have. The futures market has now become a relevant tool for most Virginia producers, even the smaller or modest sized producers. With the advent of Forward Pricing Inc. almost any producer can lay off his price risk in the futures market without having to have a full contract load of cattle. With the current higher cattle prices, being able to avoid price risk become more important. Producers have more invested in each head of cattle and the market has farther to fall. To effectively use forward pricing or other risk avoidance techniques, the backgrounder will have to keep his pencil sharp. The producer has to know when the market is offering him an acceptable return above his breakeven price and when he can bear the price risk himself and when its advisable to shift the risk to someone else.

Figure 5. GRAZE 450 LB. STEER

	275 LB GAIN		300 LB GAIN		325 LB GAIN	
SALE WT. & PRICE	725 LB @ $81.75		750 LB @ $81.50		775 LB @ $80.75	
450 LB STEER PURCHASE PRICE	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.
$100.00	$74.60	$51.84	$72.20	$69.75	$69.80	$84.86
$105.00	$77.90	$27.91	$75.30	$46.50	$72.90	$60.84
$110.00	$81.20	$3.99	$78.50	$22.50	$76.00	$36.81
$115.00	$84.50	($19.94)	$81.70	($1.50)	$79.10	$12.79

* 1% DEATH LOSS

GRAZE 550 LB. STEER

	275 LB GAIN		300 LB GAIN		325 LB GAIN	
SALE WT. & PRICE	825 LB @ $77.25		850 LB @ $76.00		875 LB @ $75.25	
550 LB STEER PURCHASE PRICE	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.
$90.00	$71.10	$50.74	$69.00	$59.50	$67.00	$72.19
$95.00	$74.60	$21.86	$72.40	$30.60	$70.40	$42.44
$100.00	$78.10	($7.01)	$75.90	$0.85	$73.90	$11.81
$105.00	$81.70	($36.71)	$79.30	($28.05)	$77.00	($15.31)

* .5% DEATH LOSS

GRAZE 450 LB. HEIFER

	250 LB GAIN		275 LB GAIN		300 LB GAIN	
SALE WT. & PRICE	700 LB @ $74.85		725 LB @ $74.75		750 LB @ $74.65	
450 LB HEIFER PURCHASE PRICE	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.	B.E. PRICE	NET/HD.
$85.00	$67.00	$54.95	$64.70	$72.86	$62.50	$91.13
$90.00	$70.40	$31.15	$68.00	$48.94	$65.70	$67.13
$95.00	$73.85	$7.00	$71.30	$25.01	$68.90	$43.13
$100.00	$77.30	($17.15)	$74.60	$1.09	$72.10	$19.13

CUTTING FEED COST IN BACKGROUNDING PROGRAMS

John Gerken, Extension Animal Scientist
Va. Tech

Backgrounding calves in Virginia is a growing enterprise. Cow-calf operators recognize that lighter calves can often be made more profitable if grown to heavier weights before sale. Other producers recognize the economic opportunity of buying light calves to grow out to heavier weights on inexpensive forages and other feeds. With stable cattle prices and higher feed costs, it will take better management to turn a profit in 1989.

Types of Backgrounding Programs

There are two main backgrounding programs employed during the winter months in Virginia. The types of programs and desired rate of daily gain for each are as follows:

1. Calves wintered to be grazed next summer: rate of gain - 1.0 to 1.3 lb per day.
2. Calves to be sold in the spring, generally to feedlots, or heifers to be bred at 13-15 months of age: rate of gain - 1.3 to 2.0 lb per day.

Level of Winter Gain

The level of winter gain in backgrounding programs affects the gains obtained in the next stage. Calves wintered to gain about 1.0 lb per day will make satisfactory summer pasture gains and is the preferred program if ownership is to be retained through the next phase. This is illustrated in the following table which shows the impact of low or high winter gain on summer gain and total gain for the entire period.

Table 1. Effect of winter gain on subsequent summer gain*

	Winter	Summer	Total
		lb	
Low	115	205	320
High	186	162	348
Low	67	226	309
High	136	183	319

*Nebraska data

Since summer grazing programs are designed to take advantage of less expensive grass, lower levels of winter gain are acceptable. Most experts feel that gains of around 1.25 lb per day are needed for calves to maintain condition.

Calves to be sold in the spring need to make more gain to offset higher winter feed costs, fixed costs spread over fewer total pounds produced by market time, shorter time of ownership, and other factors. Gains approaching 2.0 lb per day are needed, thus a higher level of nutrition must be provided. Replacement heifers also need to gain at a rate that will get them to their optimum target weight by 13-15 months. Gains of 1.5 to 2.0 lb per day are generally required.

Factors to Consider in Backgrounding Programs

1. Lightweight calves gain more efficiently than heavyweight calves. Much of this effect is due to a lower maintenance requirement.
2. Lightweight calves need higher quality feed. Forage alone will only permit a lightweight calf to maintain itself.
3. Faster gains are cheaper. A calf gaining 2.4 lb per day requires about 373 lbs of TDN per 100 lbs of gain; a calf gaining 1.1 lb per day will need 675 lbs of TDN to make 100 lbs of gain. It all goes back to maintenance; a smaller share of total energy intake goes for maintenance when the rate of gain is higher and the feeding period to reach a target weight is much shorter.

The following table shows that the percentage of total daily feed intake used for maintenance has about these relationships to rate of gain.

Table 2.

Daily Gain lb/day	% of Feed Used for Maintenance
0	100
1	70
2	50
3	33

Ration Costs Can Vary

It is obvious that not all growing rations cost the same. In this year of high grain and protein supplement costs, it will pay to look for lower cost alternatives. In terms of saving money on protein, use of NPN supplements such as urea or other sources of inexpensive protein such as poultry litter will be profitable. The following table compares three different rations that are all designed to provide for about 2.0 lb per day gain on 500 lbs, medium frame steers.

Table 3. Comparison of three rations using different protein sources

	Ration		
	1	2	3
Ingredient		%	
Limestone	0.19	0.16	-
Corn silage	95.23	96.81	32.36
Urea	0.33	-	-
Wheat	4.24	.11	19.06
Soy 44	-	2.92	-
Broiler litter	-	-	48.58
	100.00	100.00	100.00
Cost/ton, $	35.20	38.00	49.00
Cost/cwt. D.M., $	4.67	5.17	3.92
Cost/lb gain, ¢	28	31	24
Cost/day, ¢	56	62	48

All three rations contain 67.5% TDN and 11.4% crude protein, amounts needed by 500 lb calves to make gains of 2.0 lb per day. The silage rations contain about 37% dry matter; the litter ration is 65% dry matter. According to this

simple example, a saving of about $21.00 per head could be realized from feeding the broiler litter ration while use of urea and a small amount of wheat would save about $9.00 in a 150-day winter feeding period.

Extension agents have a microcomputer program called BEEF FEEDER that can be used to formulate balanced rations by selecting from a large variety of feeds. The program can also be useful in comparing the relative costs of different ingredient combinations as was done in the example above.

Substitute Feeds

Elsewhere in these proceedings in the article entitled "Wintering Cattle With Limited Hay" is a table of alternative feeds to consider in this year of high prices. Based on $3.00 or $3.50 per bushel corn and $300 per ton for soybean meal, the prices quoted are equivalent to corn and soybean meal. In other words, if the feed listed can be purchased for less, it is a better buy than the corn/soy combination. Urea-based feeds, poultry litter and corn gluten feed are among the list of feeds that could be substituted to advantage in backgrounding rations.

What About Poultry Litter

Broiler or turkey litter can be substituted to advantage in backgrounding programs in which protein and extra TDN are required. Priced at $30.00 per ton or less, broiler litter has a value of well over $100.00 per ton. Stated another way, a pound of crude protein from litter will cost about 20% as much as a pound of crude protein from soybean meal. Litter can make up 30% - 40% of the dry matter in rations in which gains of 2 lbs per day are desired and even greater amounts can be included in rations where lower rates of gain are acceptable; perhaps, even as high as 60-70% of ration dry matter. For example, an inexpensive growing rations is one composed of corn silage at 70% of dry matter and litter at 30%. Four to five weight calves will gain quite well on a ration consisting of these two ingredients. Get a copy of Extension publication 400-754 "Feeding Broiler Litter to Cattle and Sheep" for more detailed information on how to process and feed poultry litter.

Additives and Implants

Rumensin or Bovatec should be included in all backgrounding and/or growing rations where gains of 1.0 lb per day or more are expected. These additives, known as ionophores, can be mixed with the ration or provided free-choice in salt-mineral mixtures. When litter is fed, Rumensin or Bovatec need to be blended with the ration since the salt content of litter is great enough to prevent uniform intake of free-choice mixtures that also include on salt.

Implants

Ralgro, Synovex H or S or one of the other approved implants should be used in backgrounding programs. The only exception would be for replacement heifers which should not be implanted. Use of growth promoting implants in heifers nearing puberty has been shown to be detrimental to reproduction.

Protein Supplementation of Forage-Based Backgrounding Programs

Corn silage, grass hay and possibly stockpiled fescue in late winter are examples of forages that are too low in protein to promote good intake and rate of gain without supplementation. Studies of stocker cattle wintered on low protein forage reveal some interesting facts about composition of

supplements to be used with such forages. Urea based supplements may not be as useful for low energy forages such as grass hay or weathered stockpiled fescue. Soybean meal or cottonseed meal would be better choices as shown in this report on heifers wintered on native range in Oklahoma. Adequate protein supplementation has been shown to increase low quality forage or grass intake by as much as 50 to 75%. In such cases, very positive responses in weight gain can be demonstrated. In fact, under marginal conditions, experiments have shown that grass intake can often be increased enough to result in a 1 lb difference in weight response for each 1 lb of natural protein supplement fed. The lower the forage protein, the more dramatic this response will be.

Table 4. Weight responses of heifers to protein supplementation

	Winter Weight Change, lb
On Grass Hay	
1 lb 20% CP	-11
1 lb 30% CP	+34
1 lb 40% CP	+81
On Native Range	
1 lb 20% CP	-26
1 lb 40% CP	+15
2 lb 20% CP	+15
2 lb 40%	+38

In general, conclusions on the level and amount of protein to feed with low quality forages suggest:

1. Increasing supplemental protein intake increased gain in a linear fashion.
2. Low protein supplements (11.5% CP or less) were ineffective.
3. When larger amounts of lower protein level supplements are fed, forage intake may actually decrease because of substitution of supplement for forage.
4. Current economics appear to favor a high protein supplement (ie - 40% CP) regardless of the amount fed per day.
5. Lower protein supplements (ie - 20% CP) may cost about 50% more per unit of protein than soybean meal.

What About Supplements for Stockers Grazing Fescue in Summer

Studies conducted this summer on feeding a high protein cube (40% CP) to steers or heifers grazing pastures that contained considerable endophyte infected fescue were inconclusive. It appeared that lighter cattle may have benefited more, perhaps, due to a higher protein requirement. Nevertheless, it's too early to make a recommendation on the value of high protein supplements at limited rates for summer pasture use.

However, Missouri research reported interesting results with cattle supplemented with corn or corn and soybean meal from mid-June to early September. The forage grazed contained about 9% crude protein on a dry matter basis.

Table 5. Corn or corn SBM supplement for steers grazing fescue pastures

Treatment	Control	Corn	Corn-SBM
No. head	15	16	16
Supplement/hd/day			
Corn, lb	0	4	3
SBM, lb	0	0	1
Days	83	83	83
Initial wt., lb	801	815	798
Final wt., lb	853	914	897
Gain, lb	52	99	99
Av. daily gain	.65	1.19	1.19
Difference, lb		.54	.54
Suppl./lb extra gain		7.4	7.4
Suppl. cost/lb extra gain, $		.30	.42

Rumensin was in the supplements so some of the extra gain over controls was attributable to the ionophore. In either case, supplementation would have been profitable at current prices but there was no advantage to the extra protein for these heavy cattle. There may have been a beneficial response in lighter cattle which have a higher protein requirement.

THE IMPORTANCE OF SELENIUM AND MAGNESIUM IN CATTLE MINERAL PROGRAMS

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Cattle require seven macrominerals and at least seven microminerals in their diet. The two groups are divided based on the relative amounts needed. In general terms, macromineral requirements are stated in grams or grams per day while macrominerals, also called trace minerals, are needed in much smaller amounts which are usually calculated in milligrams or milligrams per day. The macrominerals are calcium, phosphorus, potassium, sodium, chlorine, magnesium and sulfur. Calcium is usually adequate in forage based rations while phosphorus is more likely to be lacking unless concentrates, a good source of phosphorus, are included in the diet. Sodium and chlorine are supplied by salt and potassium is also plentiful in forage. Sulfur is generally adequate but is of concern when urea or other forms of non-protein nitrogen is included in the diet. Magnesium is a special case since it plays a key role in the prevention of grass tetany and will be commented on in greater detail. In summary, phosphorus is usually the macromineral that should be emphasized in a general forage-based cattle mineral supplementation program, but there are exceptions depending on other components of the ration. Look for a cattle mineral that has a 2:1 calcium-phosphorus ratio and contains phosphorous at a level of 8% or higher. In general, cattle minerals with a wide calcium-phosphorus ratio such as 4:1 will be cheaper but not as nutritionally sound except for feedlot cattle fed diets high in concentrates.

The microminerals considered important for cattle are iodine, cobalt, iron, copper, zinc, manganese and selenium. The first six of these are normally found in trace mineral salt as well as being routinely included in commercial mineral products. Therefore, the emphasis on microminerals in the remainder of this presentation will focus on selenium.

Magnesium. Magnesium is widely distributed in the body and is involved in many important bodily functions. About half of the magnesium in the body is found in bone where it makes up 0.5-0.7% of bone ash. In soft tissue, it is concentrated within cells. It is required for many enzymatic reactions related to energy metabolism and other essential body functions. Magnesium is normally present in adequate amounts in many feeds. The magnesium requirement for beef cows has been determined to be about 0.2 percent of ration dry matter. Concentrates and many forages have adequate amounts of magnesium but low quality hays, lush spring pasture, and small grain pasture frequently have insufficient magnesium or have factors present which make adequate magnesium unavailable to the cow. Lactating cows are the animals most often affected by a condition known as "grass tetany" but sometimes the condition will occur in pregnant cows close to calving. It is also seen in young cattle grazing small grain pastures and as such is known as "wheat pasture poisoning". It rarely occurs in Virginia in cattle other than mature, lactating or pregnant cows. Grass tetany is important because, more often than not, the first sign of a problem is to find a cow, often one of the best in the herd, dead in the pasture. Close daily observation of cows with calves at turnout time on spring grass may make it possible to detect early symptoms of the disorder. Affected cows are often in an excitable state and may even attack a person who comes near them. They may appear blind and will often go down if driven or

disturbed. Grinding the teeth, trembling and thrashing about with the legs followed by a deep coma and death are other symptoms often observed. Death can sometimes be prevented by prompt injection of calcium gluconate. Blood serum magnesium levels of 1.0 milligrams or less per 100 ml. are associated with grass tetany while normal values are 2.25 milligrams.

Grass pastures beginning spring growth on soils high in nitrogen and potassium and low in magnesium offer the greatest danger. The weather also plays a role; cloudy, wet, windy days with temperatures between 40° and 60°F and soil temperatures below 50°F are frequently associated with the occurrence of grass tetany.

Grass tetany is a costly and perplexing problem, but it can be controlled effectively by proper management including the provision of supplemental magnesium to cattle that are at risk. The following suggestions should cover most situations.

1. Provide supplemental magnesium from October through May. Free-choice mineral supplements should be continuously available at several convenient locations within the pasture. Commercial high-magnesium minerals mixtures (preferably about 12% magnesium) and high magnesium blocks are a possibility and offer convenience. Any of the following mineral mixtures are also suitable and the choice depends on price, convenience and availability.
   a. Equal parts by weight of: Trace mineral salt, dicalcium phosphate or bone meal, magnesium oxide and either dried molasses, soybean meal or ground corn or some other palatable feed.
   b. Trace mineral salt - 75 parts, and magnesium oxide - 25 parts.
   c. Ground corn - 65 parts, magnesium oxide - 20 parts, trace mineral salt - 15 parts.
   d. Cottonseed or soybean meal - 65 parts, magnesium oxide - 20 parts, trace mineral salt - 15 parts.

Magnesium oxide is the magnesium source generally used, because it is readily available and relatively inexpensive. The following table gives a ranking of magnesium sources including magnesium oxide. Note that dolomite (high magnesium limestone) and magnesite (a naturally occurring mineral form of magnesium carbonate) are not very available to animals but would be suitable as liming agents to bring up soil magnesium levels.

Table 1. Sources and availability of magnesium for ruminants*

Source	Availability, %
Magnesium oxide (MgO)	85
Magnesium chloride (MgCl)	90-100
Magnesium carbonate ($MgCO_3$)	86-113
Magnesium sulfate ($MgSO_4$)	58-113
Dolomite	28
Magnesite	Low

*Feedstuffs, 10-17-88

Other suggestions that may help prevent grass tetany in cows are:

1. Don't graze spring pastures until growth reaches 8-10" in height or provide legume hay if grazed earlier.
2. Graze legume or legume-grass pastures first before grazing pastures with little or no legume in the lush growth period.
3. Graze less susceptible animals on high risk pastures. Dry cows, heifers, cows with calves over 4 months of age and stockers are less susceptible.
4. Take special precautionary measures with cows with a history of grass tetany. Remember that older cows are most susceptible; grass tetany is seldom observed in first calf heifers. Mature cows in late pregnancy or early lactation are highly susceptible to tetany.
5. Use dolomitic limestone whenever possible to improve soil and forage magnesium content.
6. Apply fertilizer, especially nitrogen and potassium in split spring and fall applications rather than one spring application.
7. Be aware that small grain pastures; wheat, rye, barley, oats or triticale, are even more dangerous than cool season grasses such as fescue, orchardgrass or bluegrass.
8. Consult your veterinarian and have a supply of the intravenous solution which usually contains both magnesium and calcium on hand so that prompt emergency treatment can be administered promptly.
9. An alternative emergency treatment is to give an enema consisting of 60 grams (about 2 oz) of magnesium chloride ($MgCl.6H_2O$) dissolved in 200 cc of water. This can be given by use of a plastic squeeze bottle or funnel connected to a plastic tube which is inserted into the rectum of the cow. This treatment may be easier to administer than the intravenous route for persons who are experienced in giving intravenous injections. Magnesium chloride should be obtainable from a pharmacy.
10. For more detailed information, get a copy of Publication 400-589 entitled "Grass Tetany and Its Control" from your extension office.

Selenium. Selenium is an essential micromineral or trace element for beef cattle. Virginia is located in a region of the U.S. in which soils are low to marginal in selenium content. There is evidence that selenium deficiencies are occurring in Virginia cattle herds more frequently. The need for supplemental selenium in Virginia Tech's beef cattle herds has become apparent and selenium is now routinely included in the mineral feeding program. Based on these observations, Va. Tech is recommending the inclusion of selenium in all cattle mineral supplementation programs. Since Virginia soils have a low selenium content, forages grown on those soils can also be expected to be low in selenium. Beef cattle are fed almost entirely on forages in the cow-calf and stocker production phases of the industry. Therefore, such cattle are more likely to experience a deficiency of selenium than are cattle fed diets containing feeds brought in from areas where soil selenium levels may be higher. Increased crop yields may be one possible explanation for increased selenium deficiency problems. Research conducted in Illinois reported that when corn yields doubled from 70 to 140 bushels per acre, selenium levels in the corn grain dropped from 0.2 ppm to less than 0.1 ppm. While the latter is considered adequate, it illustrates that increased fertilization and higher yields can reduce selenium content in feeds. Drought is another factor that could result in lower than desirable selenium levels in forage in some years.

Selenium deficiency can result in white muscle disease in calves. It also is known to be involved in suppression of the immune system, unthriftiness, non-

specific diarrhea, reproductive failure, retained placentas and dead or weak offspring at birth.

Acute selenium deficiency can be corrected by injections of Bo-Se or Mu-Se. Pregnant cows, newborn calves and incoming feeder cattle are all candidates for the appropriate injection which immediately elevates selenium levels in the body. The problem is that injection is only a temporary solution and if the diet is deficient, selenium levels will drop below desired levels in as little as 30 to 90 days after treatment.

The Federal Drug Authority (FDA) regulates the level of selenium that can legally be added to cattle rations. Current standards are: (1) selenium can be added to the complete diet at a level no greater than three tenths parts per million (0.3 mg/kg); (2) selenium can be included in a supplement to provide no more than 3 milligrams per head per day or (3) selenium can be included in a free-choice salt-mineral mixture at up to 120 parts per million (120 mg/kg) so long as the daily intake does not exceed three milligrams per head.

The free-choice salt-mineral supplement route is the most practical for cow-calf and stocker operators. In the past, commercial mineral mixes had selenium levels that were often too low to be effective. Due to new (1987) FDA rules, mineral suppliers are now able to offer higher levels of selenium in their products. Now you will find commercial mineral mixtures that contain, for example, .00264% selenium. This is equivalent to 26.4 parts per million (ppm). If an animal consumes four ounces of this mineral per day which is the level of intake recommended by the manufacturer, that animal will receive 3 milligrams of supplemental selenium. A similar result will be obtained from a mineral product containing .00352% (35.2 ppm) if the anticipated intake per day in this particular instance is three ounces per day. An easy way to convert percent to parts per million is to move the decimal point four places to the right. To sum up, commercial minerals to be considered adequate in selenium for general use in Virginia should probably have more than .0020% (20 ppm) selenium.

In fact, research conducted at Va. Tech suggests that levels higher than 20 ppm are desirable in bringing about a return to normal selenium blood levels in deficient cattle. Cattle offered a free-choice salt/mineral mixture that contained 20 ppm selenium did not achieve the desired blood selenium level of 70 ppb (parts per billion) in a 108 day trial. Cattle fed a supplement with 80 ppm selenium reached the desired level in 28 days. All cattle in this study had low blood selenium levels, less than 20 ppb, at the start of the experiment.

Producers can prepare their own custom mineral mix that will provide adequate selenium. Selenium premixes are available from several sources. Those generally available contain either 200 ppm (.02%) or 600 ppm (.06%). These amounts are equivalent to either 90 or 270 milligrams per pound. Therefore, care must be used to mix these preparations properly with other ingredients so that there is no chance for overconsumption. Selenium can be toxic at high levels.

Here are suggestions for a general use mixture for year-round feeding to stocker cattle and replacements or for use with the beef cow herd from May to

October when magnesium supplementation to prevent grass tetany is not a major consideration. The suggested level of selenium in the final mixture is 60 ppm or one-half the maximum FDA approved level. It is assumed, based on Va. Tech research, that regular consumption of this level will be adequate to raise blood selenium to an appropriate level and maintain satisfactory selenium status thereafter.

The formula for general purpose use is as follows using either selenium premix.

	General Use (60 ppm Se)	
	A	B
Dicalcium phosphate	35%	45%
Trace mineral salt	35%	45%
Selenium premix (200 ppm)	30%	-
Selenium premix (600 ppm)	-	10%
	100%	100%

Selenium supplementation for the brood cow herd becomes more complicated when magnesium needs to be supplied to prevent grass tetany. This problem is more easily solved with the more concentrated selenium premix (600 ppm). Here is a suggested formula for this situation that relates to the grass tetany suggestions made earlier in this presentation. Simply put, include as 10% of the mixture, the 600 ppm premix to achieve a concentration of 60 ppm. An example might be:

Dicalcium phosphate	22.5%
Trace mineral salt	22.5%
Magnesium oxide	22.5%
Dry molasses	22.5%
Selenium premix (600 ppm)	10.0%
	100.00%

If only the 200 ppm premix is available, here is a suggested formula that contains 20 ppm selenium as well as about 12% magnesium:

Dicalcium phosphate	40%
Trace mineral salt	30%
Magnesium oxide	20%
Selenium premix (200 ppm)	10%
	100%

Several further points to remember are:

1. Trace mineral salt does not contain selenium.
2. Too much selenium is potentially toxic. Use care in mixing and feeding to prevent overconsumption. Observe the 3 milligram per day limit on supplemental selenium.
3. Do a thorough mixing of ingredients if you prepare your own mixtures.
4. Consider using a commercial mixture with a high level of selenium if uncertain about your capability to obtain and prepare a satisfactory custom or "on-farm" mix.

WINTERING CATTLE WITH LIMITED HAY

John Gerken
Extension Animal Scientist

Hay is short in southwest Virginia and other parts of the state as we begin the 1988-89 winter feeding period. Several estimates put the hay supply at 50-60% of normal. The cow/calf and stocker operators who depend almost entirely on hay for winter feed for their cattle are faced with the dilemma of either cutting numbers to match feed supplies or purchasing feed to supplement a short hay crop. Even those who normally have silage to feed have seen yields cut drastically. Yet, cattle prices are good in 1988, and it appears probable that 1989 and perhaps 1990 and 1991 will be good times to be in the cattle business. Thus, beef cattle producers, in most instances, will want to maintain numbers in order to benefit from the good times that appear to be ahead. It will take some planning and action to accomplish this goal in an economical manner.

The ASCS livestock feed programs will be of benefit to those who qualify but even those who are not eligible for these programs have several options that may be better than selling out or purchasing all the hay needed to replace the shortfall in this year's production. Here are some suggestions to consider. Not all will apply to every situation but all merit consideration by those wanting to stay in the cattle business at their current level without spending unnecessary dollars between now and April.

Feed Shortage Suggestions

1. Cull the herd!
2. Inventory feed resources!
3. Make wise use of crop residues and late season pasture!
4. Get forage tested!
5. Group cattle for feeding!
6. Avoid feed waste!
7. Use appropriate feed additives!
8. Balance rations!
9. Supply needed minerals and vitamins!
10. Control parasites!
11. Creep feed or creep graze calves!
12. Use alternative feeds!

Now let's take a brief look at each of these suggestions in a little more depth.

1. **Cull the herd!** Get rid of open cows, marginally productive cows, old cows that are on the decline in condition or milking ability, late calving cows and cows that were bred late. Cows with short or missing teeth, crippled cows, cows with poor udders, and even that wild cow or two should be fair game for culling. Let's take the example of a 50 cow herd from which 10 cows (20%) can be culled. A cowman with 50% of the hay needed for 50 cows would have 63% of the hay needed to winter 40 cows. Let's say the cull cows weigh 1000 lbs and sell for $47 per cwt. That's $4700 plus culling 10 cows means 20 tons less hay will be needed. At $125 per ton, 20 tons would cost $2500 which added to the $4700 from the cull cows means the cowman could buy 10 cows in the spring at $720 per head and be in a break-even situation. Keep good young cows, first calf heifers and perhaps some of

your biggest and best heifer calves. By all means, get your cows pregnancy checked and sell open cows!

2. **Inventory Feed Resources** - Count bales, estimate weights as accurately as possible and don't forget to include crop residues such as corn stalks or straw or other roughage substitutes that might be available. Check on the cost of such feeds as brewers grains, pelleted peanut hulls, broiler litter and the like. Remember, you'll need an inventory of the feed on hand in order to apply for assistance from ASCS.

3. **Make Wise Use of Crop Residues and Late Season Pasture.** Perhaps, this is obvious but don't waste any opportunities to let cows or stockers help stretch feed reserves by prolonging the grazing season as long as possible. Graze hay fields, orchardgrass or bluegrass pastures and any cornfields harvested for grain early in the season. Make full use of stockpiled fescue remembering that it will decline in quality as the weather gets more severe. As quality of the grazeable forage goes down, don't wait too long to start limited supplementation with some grain or a little good hay. This will help stretch the grazing while preventing the cattle from losing condition. Be aware of opportunities that might be available to graze accumulated forage on neighboring farms that were not stocked or were understocked last summer. A little electric fence might be a good investment here!

4. **Get Forage Tested!** Having test results of the hay on hand will help when it's time to work on suggestion 8. It will also help to avoid mistakes like feeding an expensive supplement such as protein blocks when protein is not needed.

5. **Group Cattle for Feeding!** Don't try to feed everything together in one herd. Dry cows can get by on less; cows nursing calves need more and better feed. Bred heifers and first calf heifers have higher requirements than mature cows. Don't make them compete with older cows for limited feed supplies. Feed heifer calves kept as replacements at least 3/4 to 1% of their weight in concentrates each day so that they gain at least 1.25 lbs per day.

6. **Avoid Feed Waste!** Plan feeding to avoid waste. Unroll large round bales or use ring feeders to prevent trampling, soiling and wastage of valuable hay. Limit feeding of hay to make cattle clean up what is offered especially if grain or other feeds will be supplied. Feeding concentrates will require adequate trough space so all can get their share. When all animals eat at once, calves to 600 lbs require a minimum of 18", over 600 lb cattle require 22", and mature cows need 26". Salt-limited grain or supplement self-fed and always available reduces the space per head to 3" to 4". If troughs are not available, whole shelled corn can be fed on clean sod. Any loss in feed efficiency will be more than offset by savings on troughs and grinding cost.

7. **Use Appropriate Feed Additives.** If grain or protein supplement is fed, make sure Rumensin or Bovatec is included. The feed efficiency gained will more than offset cost. Use free choice mineral vitamin supplements or blocks if that works best. Be sure to use Rumensin or Bovatec with all young growing cattle. The use of these additives for cows is justified as

significant feed savings can be realized when cows are wintered on harvested feeds. Their use with grazing cows is economically questionable. When feeding either Rumensin or Bovatec, aim for intake of at least 100 mg per day in cattle under 500 lbs, 150 mg per day for cattle weighing 500-700 lbs and 200 mg per day for cattle over 700 lbs including cows.

8. **Balance Rations!** Use forage tests and feed tables to figure at least TDN and protein levels in available feeds and know the requirements of each class of cattle being wintered. Your Extension Agent can help you make these calculations. For example, cows can get by on as little as 0.5 lb of hay per 100 lbs of bodyweight if the balance of their TDN and protein requirements is supplied from other sources. A balanced ration for a 1,000 to 1,200 lb cow using minimum hay is 6 lbs of hay and 9-10 lbs of whole or ground shelled corn. This will often be a cheaper ration than the 20-25 lbs of hay such a ration replaces.

9. **Supply Needed Minerals and Vitamins!** A free choice mixture of equal parts by weight of dicalcium phosphate, trace mineral salt, magnesium oxide and soybean meal or some other palatable feed is one good approach to mineral supplementation of cows. it can be made even better if 5-10% of the final mixture consists of a 600 ppm selenium premix so that the final mixture contains 30 to 60 ppm of supplemental selenium. For young growing cattle (stockers) or replacement heifers who don't need magnesium supplementation, a mixture of 60% dicalcium phosphate, 30% trace mineral salt and 10% 600 ppm selenium premix is suggested as a free choice mixture. Of course, a good commercial mineral product that supplies high levels of magnesium and selenium (at least 26 ppm selenium which is equivalent to 0.0026% as usually stated on the tag) can be used to good advantage by those who don't choose to make their own custom mix. At least 8% magnesium is preferred if grass tetany prevention is a concern. Keep mineral mixtures fresh, clean and available at all times for best results. Twice a week replenishment of mineral feeders is suggested.

10. **Control Parasites!** Grub and lice treatments should have been applied before November 1 but will need to be reapplied around January 1 to control lice for the entire winter. Refer to current recommendations regarding treatment of various classes of beef cattle to control internal parasites. Your extension agent has information on this topic.

11. **Creep Feed or Creep Graze Calves!** Use some form of creep for fall born calves as soon as they will eat it (about 1 month of age). High quality alfalfa hay is a possibility; so is a mixture of 60% cracked corn, 30% whole oats and 10% soybean meal. When rye pasture is available, creep graze it. Creep grazing and/or creep feeding takes some of the suckling pressure off cows so they can get by on less or do better if feed quantity and/or quality is less than desirable.

12. **Use Alternative Feeds!** Corn will generally be the best choice to extend limited hay supplies. Shelled corn is generally available, can be fed whole, cracked or ground depending on availability of processing equipment and feeding troughs. Since it often costs $10-$15 per ton to process shelled corn and any gain in feed efficiency from processing will be in the range of 5%, there is little to be gained by processing in situations such as exist this year. It would generally be cheaper to just feed 5% more

whole shelled corn to offset the anticipated loss in efficiency of utilization.

Poultry litter is another economical alternative to consider. Broiler litter is preferred but turkey litter may also be used if of good quality and properly processed. Palatability of turkey litter appears to be lower than that of broiler litter, therefore using lower amounts and blending carefully with other feed such as silage or concentrates may be required. The following table shows the estimated equivalent value of a number of energy feeds, protein feeds and roughages on an "as fed" basis. The table developed by Robert Stewart, Georgia Extension Animal Scientist, shows the price per bushel, per cwt, or per ton at which a feed would be equivalent in value to corn at either $3.00 or $3.50 per bushel and soybean meal at $300 per ton.

For example, broiler litter is worth $147.17 per ton as a protein feed when corn is $3.00 per bushel and soybean meal costs $300. Since good quality broiler litter is available in many areas for $30 per ton or less, it is a good buy as a protein feed. Its value as filler to extend hay drops sharply but at $30 per ton it still should be considered. Combined with shelled corn and limited hay, poultry litter is a better alternative than purchased hay at $80 per ton or higher for many situations.

The information in the table is useful but it has limitations. No consideration has been given to palatability, handling, storing, or the maximum amount to use in a ration. Corn is a cheap source of energy, but it can't be used as 100 percent of a beef cow ration. Peanut hulls may cost less than $61.50 per ton but cows will starve to death if that is the only feed. On the other hand, a ration of corn, peanut hulls and broiler litter could be used in a number of situations to good economic advantage. The point here is to identify the cheapest available sources of energy, protein and roughage for a given situation and then use those feeds to provide a balanced ration based on the needs of the livestock that must be fed. Anyone needing help with these calculations should contact their local extension office for advice and assistance.

ESTIMATED VALUE OF FEEDS

Ingredient	Unit of Measure	% Dry Matter	% Crude Protein	% TDN	Value @ $3 Corn ($)	Value @ $3.50 Corn ($)
Energy Feeds						
Alfalfa Pellets	ton	92	17.0	57	137.04	144.58
Barley	bu.	88	11.5	74	2.86	3.22
Corn	bu.	88	8.5	80	3.00	3.50
Ear Corn	cwt.	87	7.8	73	4.91	5.71
Milo	cwt.	88	9.0	70	5.13	5.86
Molasses	ton	75	4.5	58	68.55	82.13
Oats	bu.	88	11.7	66	1.83	2.03
Wheat	bu.	88	10.0	80	3.47	3.98
Protein Feeds						
Brewers Grain (wet)	ton	22	6.2	17	47.13	48.86
Broiler Litter	ton	75	21.0	41	147.17	148.54
Corn Glutten Feed	ton	90	19.0	72	159.40	170.07
Cottonseed (whole)	ton	93	22.0	85	185.80	198.59
Cottonseed Meal	ton	92	41.0	72	281.28	281.78
Liquid Protein	ton	75	32.0	56	219.39	219.73
Protein Block	cwt.	95	32.0	62	11.20	11.29
Range Cubes (20%)	ton	95	20.0	47	146.14	149.59
Soybeans (whole)	bu.	92	38.0	84	8.21	8.36
Soybean Meal 44	ton	90	44.0	75	300.00	300.00
Roughages						
Alfalfa Hay (good)	ton	85	18.0	54	140.33	146.59
Alfalfa Hay (fair)	ton	85	14.0	48	113.66	120.15
Corn Silage (good)	ton	35	3.0	24	34.67	39.76
Corn Silage (fair)	ton	35	2.6	19	28.69	32.66
Corn Stalks	ton	85	5.6	43	63.36	72.38
Corn Stalks (w/ammonia)	ton	85	11.5	53	103.57	112.56
Cottonseed Hulls	ton	90	4.0	40	52.24	61.19
Grass Hay (good)	ton	85	9.0	48	85.96	94.76
Grass Hay (fair)	ton	85	7.2	45	73.73	82.55
Peanut Hay	ton	88	8.0	40	74.40	81.50
Peanut Hulls	ton	92	7.3	28	61.50	65.69
Sorghum Silage	ton	30	2.1	18	25.17	29.06
Soybean Hulls	ton	90	10.8	72	113.98	128.43
Soybean Stubble	ton	90	4.5	37	52.75	60.67
Wheat Straw	ton	90	3.2	37	45.55	54.06
Wheat Straw (w/ammonia)	ton	90	11.5	52	102.81	111.54

MAKING MAXIMUM USE OF PASTURES

John Gerken, Extension Animal Scientist
and Jim Myers, Buckingham Extension Agent

The Situation

Beef producers in the Lynchburg area and the Southern Piedmont region, in general, depend to a very great extent on pastures to supply the feed needed by their cattle. While some grain, silage and other feeds such as broiler litter are used primarily for stocker cattle and replacements, most cow herds are normally fed entirely on pasture and hay. More often than not, the hay is harvested from the excess spring growth that occurs each year on land that is then grazed for the remainder of the season except in years when overall forage production is great enough to allow for a second hay cutting. Thus, most cow herds are totally supported on land used for a combination of grazing and hay making. Hay is used in growing and backgrounding programs but generally is supplemented with other feeds to achieve a desired level of winter gain. In summer, stocker cattle and replacements are grazed on pastures that are similar in botanical composition to those grazed by the cow herds that predominate in the area.

Fescue Is Dominant

Tall fescue is the dominant cool season species in the region although this dominance is by no means complete. Most pastures contain other cool season grasses such as orchardgrass or bluegrass in varying amounts. Legumes such as ladino clover, red clover, annual lespedeza and perhaps others may or may not be present depending on overseeding practices, fertilizer and pH status and other factors. In summer, many annual grasses such as foxtail, crabgrass or Dallis grass may make a significant contribution to total forage supply if summer moisture conditions are adequate. Warm season perennial grasses such as common bermuda grass are often present in permanent pastures and make a contribution to the mix of forages from May to September.

Thus, while fescue is perhaps the dominant species in most pastures, this dominance is tempered by the presence of varying amounts of other species. It has been my observation and that of others that fescue tends to become more dominant with time especially over orchardgrass and bluegrass which are preferred to fescue by grazing livestock and which are perhaps not as well adapted to the soil and climatic conditions of the region.

Like Dr. Jekyll and Mr. Hyde, fescue has good and bad attributes that are recognized. Fescue is a hardy, productive grass suited to many situations. It will survive and spread under many management and environmental situations. No other cool season species is so well adapted to the practice of "stockpiling" in which late summer and fall growth is allowed to accumulate until grazed in late autumn and early winter. Experimental results confirm what farmers have come to recognize; stockpiled fescue is an excellent way to reduce feed costs for beef cattle by extending the grazing season to the greatest possible extent and thereby reducing reliance on harvested feeds to the minimum. Time doesn't permit going into detail about the practice of stockpiling fescue or its application to beef cattle production with both the cow herd and with stockers. In summary, this is one of the strongest positive factors about the shift to more fescue in the region. The mild winters that generally occur plus the short time that heavy snow accumulation persists most winters make this area ideally suited to take advantage of stockpiled fescue.

The Endophyte Situation

The major "bad" attribute of fescue appears now to be related to the presence of the endophyte fungus which is commonly found to be present at some level in most existing stands of fescue. While levels range from 0% to 100% in different situations; an average of 70% infestation may be a reasonable estimate of the general situation. Without going into detail, this level is certainly high enough to be damaging to livestock performance. In beef cattle, the most generally observed economic effect is lower than normal or anticipated weight gain. It's not uncommon to observe reduced rates of gain in stockers or suckling calves of one-half pound per day or more. Certainly, this is an economic concern for most producers. Fortunately, the adverse effects are generally present to the greatest extent only for that portion of the year where temperatures are high. In cooler weather, the effects are still present but are not as drastic. Another moderating factor is probably due to the mixed population of forages found in most pastures. This may help to explain why many producers may not be aware of major problems resulting from the endophyte. The combination of a mixture of forages plus animal selectivity for forages other than fescue may be providing a "cushioning effect" against the full impact of the undesirable effects of the endophyte. The effects tend to become more noticeable as fescue becomes dominant or in drouth years when animal selectivity is reduced. Studies undertaken on farms in the region have shown low summer weight gains for fall-born calves grazing pastures when fescue predominates and where the endophyte level is above 50%.

Managing Existing Stands

Fescue is too prevalent and too well adapted to be eliminated. In many situations, we can minimize the negative animal's effect by reasonable and practical measures. Options might include:

1. Graze other species in mid-summer. On farms where orchardgrass or even bluegrass is the dominant grass, reservation of these pastures for grazing in the warmest months is a possibility. Pastures high in fescue can be grazed spring and fall or harvested for hay and then stockpiled for fall and winter use. Another possibility that offers promise is to establish warm-season perennial grasses such as Caucasian bluestem or switchgrass for grazing during the warmest time of the year. Perhaps, a tenth of the total permanent pasture acreage diverted to this use would reduce the impact of the endophyte on cattle at the critical period for either brood cows or stockers. An advantage of this approach is that excess growth not needed for grazing can be harvested as hay at a time after the optimum harvest period for cool season species such as fescue or orchardgrass.
2. Dilution is the solution. Overseeding fescue pastures regularly with clover or another legume will, if successful, reduce and largely eliminate negative effects of the endophyte fungus. To be effective, seed must be applied at the right time and under the right conditions. Drought is always a risk as young legume plants are vulnerable, but the benefits are generally so great as to make the risk worth the gamble. One personal thought is that we ought to add annual lespedeza to our overseeding mixtures. Lespedeza is a warm season annual and could help to dilute the fescue endophyte effect at a critical time if gotten established in permanent pastures. The main species to overseed are red clover and ladino, but I wonder if annual lespedeza shouldn't be considered.

Controlled Grazing

Auburn University scientists have reported increased per acre and per animal gains on endophyte infected fescue when intensive rotational grazing was employed. Their explanation was that the higher grazing pressure kept the fescue more vegetative and afforded less opportunity for seedhead consumption. Since the seedhead and seed stalk is the place where the fungus is prevalent and since its presence in leaf blades is seldom observed, it could be true that keeping the fescue in a vegetative state is beneficial. Treatment with growth-regulating chemicals which prevented seed head formation also seemed to improve performance. So a management practice to reduce or prevent seed head formation and grazing could be beneficial.

Other Alternatives

Warm season annuals, particularly the dwarf hybrid pearl millets, seem to offer promise as a means of reducing the fescue fungus impact. While these forages could be provided for the entire herd, a more economically attractive approach might be to use this approach for creep grazing suckling calves in the hot months. In the case of the fall calving herd, the cow will be at a low level of milk production and probably not in need of as good nutrition as the millet will provide. The calves, on the other hand, could benefit greatly from an abundant supply of high quality forage and should respond with excellent summer gains. Excess forage could be grazed by the entire herd if necessary to control growth and keep forage supplies from getting too mature. One problem to be avoided is late planting of the millet. It needs to go in the ground in early May to assure adequate growth for creep grazing by late June or early July. Late spring dry weather is also a possible risk; if moisture is too limiting, adequate growth may not occur.

What About Creep Feeding

Another alternative is creep feeding calves on pasture. Calves on high endophyte fescue pastures will be among the best candidates to benefit from creep feeding if grain/cattle price relationships look feasible. A salt-limited intake creep feed showed promise this year in two herds in Buckingham County. More experience is needed but this could be a useful approach in herds where calves are intended to be sold at weaning and where summer gains, perhaps due to fescue endophyte influence, have been disappointing.

To summarize, here are some suggestions for pasture management in this region of Virginia.

1. Test your pastures for the fescue endophyte, find out if you have a problem.
2. Keep legumes in your pastures.
3. Seed endophyte-free fescue on a limited basis. Follow another crop or use a smother crop to eliminate old fescue. Recognize it will take extra management to establish and maintain endophyte free fescue.
4. Consider creep grazing calves on forage other than fescue such as dwarf hybrid pearl millet.
5. Consider creep feeding if creep grazing is not an option you are willing or able to consider.
6. Find a way to live with the fescue you now have. Don't overlook its advantages for stockpiling for fall and winter grazing.

MAKE MAXIMUM USE OF PASTURES

Harlan E. White, Extension Agronomist, Forages

Beef Profit Clinics
Barboursville, December 15, 1988
Middleburg, December 16, 1988

Virginia is blessed with climate and soils which highly favor the abundant growth of forage grasses and legumes. These plants, which often grow on steep areas or in other situations unsuited for cropping, provide a source of low-cost feed which supports the strong and economically significant livestock industry in the state.

There is a great opportunity for livestock producers in Virginia to improve the quality, productivity and profitability of their pastures by improving the management and utilization of them. Dividing pastures into smaller, more easily managed lots will allow greater control of the animals in relation to the pasture they are grazing.

The concept of intensive rotational grazing is not new. However, the growing awareness throughout the agricultural industry that improved management is the key to greater profits plus the availability of less expensive, more easily installed fencing are strongly encouraging the use of intensive grazing system.

There are varying degrees of intensive grazing. For example, dividing one large pasture into four smaller pastures increases the degree of intensity and improved forage utilization. However, to really benefit from the improved management it is usually necessary to go further than just 3 or 4 pastures.

Continuous grazing involves turning livestock on a pasture and simply allowing them to graze there for most of the grazing system. Grazing pressure on the total pastures is light to ensure that forage is available throughout the season. This results in much of the area being undergrazed which means that a high portion of available forage will become old and low in quality, weeds will have the opportunity to grow and produce seed, clover will have difficulty surviving, and new growth will be discouraged. At the same time, certain areas will be overgrazed because grazing animals favor the plants that are short and vegetative.

Two important basic factors needs to be considered in understanding the effects of grazing on pasture plants. They are the real basis for even considering some form of rotational grazing rather than continuous grazing.

The Leaf Area Index is a fancy term to describe the ratio of leaf area in a pasture to the soil surface area. For example, if the actual area of grass and clover leaf surface over a square foot of soil surface is 1 square foot the "LAI" is 1.0. Research has shown that for orchardgrass-clover, the ideal LAI is 5.0. In other words, growth rate of a grazed down sod increases rapidly until the leaf area of the plants is

about 5 times that of the soil area below them. The leaf surface area determines how much sunlight is intercepted to drive the photosynthetic production of plant energy. Once the LAI exceeds 5.0 in the orchardgrass sod, lower leaves are shaded and soon yellow and die. It takes an average of 30-35 days of regrowth for the plant to reach an LAI of 5.0-6.0.

Organic food reserves are used to initiate new growth in the spring and to support regrowth when defoliation of the plant is so severe that there is not sufficient leaf area remaining to provide the necessary food for the new growth through photosynthesis. As leaf area increases, more food is produced than the growing plant actually needs at that point. This excess food is stored in roots, stolons, or at the base of the leaf sheath for future use.

Plants that are continually defoliated (as with continuous grazing) do not have the opportunity to develop enough leaf area for photosynthesis to produce an excess of food which can be put into storage. As a result, the plants are constantly struggling to survive and do not have an adequate opportunity to produce deep root systems, new tillers, and large amounts of leaf surface (yield). On the other hand, leaves of plants are not defoliated (undergrazing) soon become less effective in carrying on photosynthesis in addition to decreasing in feed value.

Intensive rotational grazing basically allows the plants to build up nearly optimum leaf area (LAI 5.0-6.0) before grazing. This means the plant has had time to store reserves to support regrowth after it is grazed down. It also means that the plants are still of high quality when grazed. Then the plants are grazed (defoliated) quickly (2-3 days) and the grazing animals moved to a new area. The grazed area is allowed to make regrowth for 30-35 days before being grazed again.

This sequence favors the LAI, utilization of food reserves, and replacement of reserves discussed earlier. It also means that the grazing animals have adequate amounts of uniformly high quality forage to utilize. This is why intensive grazing nearly always produces more animal produce per acre than other grazing methods.

There are as many ways to set up intensive grazing systems as there are farms in Virginia. Water availability is obviously a concern. Different plant species needs to be utilized in the system. For example, some tall fescue (ideally about 1/3 of the pasture acreage) should be included to provide winter grazing if beef cows or sheep are involved. If stocker cattle are being used, tall fescue should be minimized and some alfalfa may need to be included. Summer annual grasses such as dwarf pearl millet fit well to ensure adequate grazing is available. Each system should be planned to produce "excess" grazing which can be harvested for hay or simply saved to be grazed later.

Forward grazing and creep grazing are similar forms of grazing management which permit the animals requiring high quality forage to have access to it. Forward grazing is normally used within a rotational grazing system. Stocker cattle, for example, are turned into fresh pastures ahead of the cow herd. After grazing the tops of the plants and the legumes available, they move to a fresh pasture and the cows "clean up" the plants left ungrazed by the stockers.

Creep grazing allows calves to leave their dams and graze into an adjoining pasture higher in quality than that being grazed by the cow herd. In addition to providing high quality grazing for the calves, this system allows heavier grazing pressure to be placed on pastures needing to be grazed closely by the cow herd. If the calves have to stay with the cows, this heavy grazing pressure will result in reduced calf gains.

It is possible to include the entire farm in a controlled grazing system. However, factors such as soil productivity, availability of water, and distance between fields, often limit the number and size of pastures to be included in the system. There is no optimum size or number of pastures. This will depend on number and type of animals, productivity of the sod, shape of the fields, availability of water, etc. Even a 3 or 4 field rotation will help, but really "intensive grazing" will require moving animals about every 3-5 days. In order to provide 30-35 days rest period 10-12 pastures are usually needed.

Under properly managed intensive grazing, sods can be expected to improve. However, fertility levels, soil pH and population of forage plants need to be reasonably good when the program is started. Fertility levels are easily maintained once the system is developed as a result of the animal waste returned to the area by the large number of animals grazing it. Overseeding of clover may be necessary initially in February or March, but intensive grazing generally makes it easier to maintain clover without the need for regular overseeding.

Effectively managing intensive grazing systems requires judgement and an understanding of the plant-animal interaction. For example, the time required for the animals to graze down a particular pasture will vary each time it is grazed. Obviously, the amount of growth present, size of animals, and number of animals will have major effects. The manager needs to leave the animals there long enough to utilize the forage present but to aim for leaving 2-4 inches of leaf to favor rapid regrowth.

The most critical and challenging time for properly grazing pastures is in the spring. It is important to start grazing early. If first grazing is delayed until pastures have made 4-6 inches of growth, it will be nearly impossible for grazing livestock to graze down a significant amount of it before heading begins. Begin grazing shortly after spring growth begins and move the livestock through the various pastures quickly or simply leave all the gates open and allow them to graze the entire area. As growth begins to "get ahead" of the grazing animals, hold them on each pasture until the forage is utilized.

Grazing animals should be moved when the amount of high quality forage left in the pasture becomes limited. At this point, plant height will be fairly uniform but not shorter than 2-3 inches. As mid-May approaches, there will usually be some seed stalks and heads that will be left. There will usually be some pastures in the system that will not be needed for grazing, so they should be harvested early for hay or silage. Harvesting should be done in the early heading stage to ensure high quality hay plus vigorous abundant regrowth for grazing.

Species of plants present in the pastures dramatically affect the decision-making process in moving livestock around in the system. For example, bluegrass can be grazed more closely than orchardgrass without affecting regrowth. Bluegrass pastures in the system should be grazed rather than allowed to reach the hay stage. Tall fescue can be grazed closer than orchardgrass but needs to have 2 or 3 inches of leaf area left for quick regrowth.

The most challenging situation (and the most common) is when the pasture is a mixture of all these species mentioned, plus others. Selective grazing then becomes a complicating factor when deciding when to move the livestock. Bluegrass and orchardgrass areas in the pasture will become quickly overgrazed while tall fescue areas will be grazed only lightly. This is where the large number of smaller pastures really begins to pay off. By putting heavy grazing pressure (large animal numbers relative to the amount of forage) on such pastures, selective grazing can be minimized.

Intensive grazing systems require that the manager plan ahead and exercise a great deal of judgement to favor both the grazing animal and the forage. Steep areas and those with limited summer water supply need to be fully utilized in the spring. In placing the interior fencing, factors such as soil type, location of water, accessability for equipment, plant species, exposure, and traffic patterns of the animals need to be considered. Plan for the drought that you know are going to occur by having extra pastures available either outside or within the intensive system. These can be fields including alfalfa stands, cut for hay in the spring or summer annuals such as dwarf pearl millet. Also consider the possibility of reducing the number of grazing animals by taking some to market.

There is often a need for additional high quality forage during the summer months. The summer annual grasses that are planted in spring when the soil warms up can be an important source of this summer grazing and/or forage.

Sorghum-sudangrass, and sudangrass are commonly used. These present grazing management problems in that, due to their high prussic acid content, they cannot be safely grazed until they are 24-30 inches tall. This means that the plants are already well ahead of the grazing livestock before they are safe to use. As a result, feed is often wasted. Also, additional grazing is often needed when the plants are only 12-15 inches tall.

The traditional pearl millet has been the Gahi types which are leafy but grow very tall (6-8 ft.) if not needed for grazing early in its development. Forage quality is high if the plants are grazed prior to heading and prussic acid is not a concern. It also makes excellent regrowth after being cut or grazed. Foxtail or German millet is another type of millet that has seen increased use in recent years as a combination summer smother crop for no-till seedings and for hay or grazing. It grows to a height of 4-5 ft and is fine stemmed and leafy. The fact that it makes no regrowth after being cut is an advantage for the no-till seeding following it but is a disadvantage if high seasonal yields are desired.

An excellent compromise for high yield of high quality forage is one of the dwarf pearl millets. These will generally not yield quite as much tonnage as the sorghum-sudans or the Gahi type of grant pearl millets. However, they are very leafy, short in stature (about 4 ft.), have no prussic acid problems, and make strong regrowth after grazing or mowing. When grazed, a 6-8 inch stubble should be left.

One of the improved, newer varieties of dwarf pearl millet is Tifleaf 1 developed at Tifton, Georgia by Dr. Glenn Burton and his co-workers. Seed of these dwarf varieties are becoming more readily available in Virginia.

Alfalfa, with its strong tap root, is often green and still growing to provide high quality grazing during the hot dry summer. It is practical to graze a particular hay cutting of alfalfa to provide valuable high quality grazing. It is best to stock heavily to graze the available forage down in 3-4 days, then move the grazers to a fresh area.

Research at Tech shows that, ideally, grazing should begin at the early flower stage. However, we also know that one cutting per season can be cut or grazed at an earlier stage of growth without injuring the stand <u>if</u> it is managed properly during the rest of the season.

While bloat is a concern, from a practical standpoint, there have been very, very few problems. (Never say never). For example, alfalfa has been part of grazing systems at the Virginia Forage Research Station for years with essentially no problems. However, usual precautions such as feeding hay before turning in the first time and giving the animals time to adjust should be followed. Having Polaxylene anti-bloat available is another safeguard.

Managing intensive grazing systems is an interesting, challenging management process that more Virginia livestock producers need to become involved in. The potential for greater profits and more productive pastures are certainly there.

INTENSIVE GRAZING MANAGEMENT

Mike Goldwasser
Producer
Abingdon, Virginia

Controlled grazing has been by far the most productive change I have made in my cattle operation. Large increases both in stocking rate and gains per animal are possible.

Advantages

Better quality pasture
- Less too-long, too-mature pasture
- Fewer weeds
- More clover in grass stands

Greater quantity pasture
- Less too-short, overgrazed pastures
  - -Less stress for grass
  - -Greater photosynthesis
  - -More water retention
- Better manure distribution

Cattle
- Easier to handle
- Greater consumption
  - -Greater palatability
  - -Stimulated by pasture changes
- Better parasite control under some systems
- Can run several small groups at times
- Can stockpile pasture more readily
- Can accurately estimate remaining pasture

Disadvantages

More work
Fields divided by fences
Increased change of disease spreading among cattle at times

There is more flexibility than some people have suggested. Two pastures are better than one, twelve are much better, but you don't need twelve. If possible, plan so that more divisions can be made later. When you want a vacation, open two or three boundaries to the cattle.

Fences can always be designed to accommodate water sources. Lanes may be necessary, but the big pasture with one water source will benefit most of all from a controlled system. A single strand of good electric fence is adequate for most cattle. When cattle vary greatly in size, two strands might be necessary.

THE INCIDENCE OF TREATMENT FOR DISEASE AND DEATH AMONG BEEF CATTLE MARKETED BY DIFFERENT METHODS IN VIRGINIA[1]

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SUMMARY

Data was collected to study the relationship between the methods and conditions associated with marketing cattle in Virginia and the incidence of treatment or death among these cattle. Simple regression analysis was used to evaluate these relationships. Market location was not related to the incidence of treatment or death. The type of sale, type of health plan, weight of cattle and processing of cattle were significantly related to the number of treated or dead cattle. Timing of processing and amount of shrink was significantly related to the number of sick cattle. The amount of weight lost by cattle during shipment seemed related to an increase in treatment among cattle, but was not related to the number of dead cattle. The number of cattle in each marketing group was strongly related to the number of cattle treated, but was not related to the number that died. Mixing cattle after shipment was significantly related to the number of dead cattle. Incidence of treatment tended to be lowest among cattle sold by direct sales. Death losses tended to be highest among cattle sold through weekly and special graded sales. Health Plan IV was associated with the lowest incidence of sickness and a low incidence of death. Death losses were similar and tended to be lowest for Health Plans I, IIA and IV. Mixing cattle following shipment increased death losses but did not affect the percent treated. Post-poning the processing of cattle for more than 24 h after animals arrive tended to be related to a greater incidence of treatment. The incidence of treatment and death appeared greatest among cattle 300 to 500 pounds. More data are needed to better substantiate the trends that seemed to be associated with the marketing of cattle in Virginia.

(Key Words: Marketing Methods, Beef Cattle, Sickness, Death.)

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INTRODUCTION

Annual losses in the United States due to Bovine Respiratory Disease Complex (BRDC) are estimated to exceed 600 million dollars. Despite the fact that numerous vaccines, antibiotics and management systems have been introduced in recent years, BRDC continues to be the major cause of sickness and death among shipped cattle. An initial data summary from the fall of 1987 suggested that about 11 percent of cattle marketed in Virginia must be treated for disease in the succeeding few weeks.

Stress has been increasingly recognized as a major predisposing component to BRDC. Mechanisms by which stress compromises immunity of the bovine respiratory systems are elucidated. Marketing cattle provides a situation where many stresses are imposed upon an animal within a distinct period of time. In addition, crowding, co-mingling, housing animals in contaminated areas, transporting animals and often concurrent weaning set the state for outbreaks of BRDC since they both intensify the stress as well as markedly increase animal contact with infectious disease agents.

Information about methods of marketing cattle in Virginia which are least likely to result in BRDC is badly needed. Cattle and calf production represents Virginia's largest agricultural sector (22%). Economic and production factors dictate that most cattle in Virginia will be marketed rather than fed to slaughter weights in Virginia. Many of these cattle will be shipped for long distances. Buyers have several options in the way they acquire cattle and need to be informed as to which will result in the least disease incidence. Market owners and managers must also address this dilemma. As evidence about disease predisposers mounts, sellers who market their cattle with the least stress will be given price incentives by buyers. The health status of the product that is presented to a buyer becomes a very important contributor to how marketable the product really is. More information on marketing factors associated with increases or decreases in the incidence of respiratory disease will certainly help producers and market operators make decisions that will increase the marketability of Virginia cattle. The objectives of this study were:

1. Compare special graded sales, weekly sales and direct farm sales as to their influence on the incidence of sickness and death among calves following feeder calf marketing in Virginia.

2. Compare health plans, site of marketing, shrink and marketing procedures, and receiving procedures as to their effect on the incidence of sickness and death among calves following marketing in Virginia.

EXPERIMENTAL PROCEDURE

Surveys were conducted to gather data about the conditions under which cattle are marketed in Virginia and the way they are handled after leaving Virginia marketing points. A Marketing Point Survey was completed during visits made to sale yard. The following items were assessed during these visits: marketing method (weekly, special, direct); time of arrival of cattle; market conditions including - availability of feed and water, number of cattle in market, daily high and low temperatures, and precipitation; ammonia level in market; an assessment of pen sanitation; and the time cattle departed from the market.

During the visit to the sale yards, buyers of lots of cattle who were willing to cooperate in supplying data were identified. These cooperators were asked to complete and return a Buyer's Survey which asked for information on cattle handling during the shipping process and the condition of cattle upon arrival at their ultimate destination. The survey also asked for information on cattle handling procedures after arrival specifically concerning levels of confinement, processing procedures and nutritional management. Visits were made to several of the buyers to discuss cattle stress and health and collect additional data. Cattle were classified as having been marketed through one of three major sale types: "special sales", "weekly sales", or "direct sales". The term "special sales" refers to marketing conducted by the Virginia Cattlemen's Association and its constituent feeder cattle associations. These sales are co-mingled sales were cattle are weighed, graded by Virginia State Officials and then sold in breed, weight, and graded lots. All special sales require that calves are dehorned and castrated, free from signs of disease and are vaccinated according to a market's prescribed health plan. "Weekly sales" are stockyard based sales held on a weekly basis where cattle are sold in owner lots. "Direct sales" describe any type of marketing where cattle are not processed through an auction ring. Private treaty, tele-auction, board and satellite sales all represent types of direct sales.

Cattle marketed through special sales are required to meet health qualifications specified by the local feeder cattle association. Health qualifications are grouped into plans. Under Plan I calves are treated with a 7-way clostridial bacterin from 50 d prior to a sale and may be treated as late as the day of the sale. Under Plan II calves are treated with the 7-way clostridial bacterin plus IBR and PI_3 vaccines at least 14 d prior to the sale and not more than 50 d before a sale. Health Plan IV requires that calves are treated with 7-way, IBR, PI_3, Haemophilus and Pasteurella bacterins and vaccines 14 to 50 d before marketing. They then receive an additional booster of the Haemophilus and Pasteurella bacterins at the market. Markets at Monterey and Dublin use a modification of Plans I and II, respectively. Modified Plan I, termed Plan IA (Monterey), not only requires that calves are treated with the 7-way bacterin 0 to 50 d before marketing (Plan I) but also requires that calves are treated with IBR and PI_3 vaccines upon arriving at the market place. Under Plan IIA (Dublin) calves are treated as described under Plan II, but then also receive boosters for Haemophilus somnus and Pasteurella infections when they arrive at the market place.

RESULTS AND DISCUSSION

Regression Analysis. Simple regression analyses ($y = ax + b$) were conducted on the survey data to evaluate the relationship between each factor assessed in the survey and the incidence of treatment or death among marketed cattle. Results of the regression analysis (Table 1) were very supportive of the trends observed among the data presented in Tables 2-6. In addition to the marketing factors presented in Tables 2-6, regression analysis was also used to test the relationship of market location, animal shrink and the number of cattle in a group and the number of cattle in a group on the incidence of treatment or death. The market location was not related to the incidence of treatment or death. The amount of weight lost by cattle during the shipping process showed a trend towards an increased incidence of treatment among cattle. Our data did not elucidate any influence of shrink on death loss. This is probably related to the relatively small number of cattle for which shrink data were available. Numerous other studies have shown that shrink is a major contributor to the stress which initiates respiratory

disease. The availability of feed and water, the amount of time cattle spend in the market place and the distance cattle are shipped are all important factors affecting the amount of shrinkage in cattle during the marketing process.

The number of cattle in each marketing group had a strongly significant influence on the number of cattle requiring treatment (Table 1). No influence was seen, however, on the death rate as influenced by marketing group size (Table 1). The increased rate of treatment in larger groups could be related to the increased exposure and social stress as well as more intensive detection and treatment programs.

Marketing Trends. Data was collected on 6,627 calves and yearlings during the fall 1987 marketing season. Of these, 629 (9.5%) cattle were treated for disease during an approximate four week period following marketing. During this same time period 58 (.88%) cattle died. The direct sale of cattle resulted in the lowest incidence of treatment (Table 2). Cattle sold through weekly and special sales experienced sickness rates that were about equal. Death losses tended to be highest among cattle sold through weekly sales and lowest among animals sold at special sales (Table 2). One group of cattle in the direct sale group experienced a very high death loss and elevated the death loss percentage for the entire group. More data is needed on cattle sold directly off the farm and through weekly sales to substantiate the trends that seemed to be related to the method of marketing.

Cattle marketed through special graded sales are subjected to one of five proposed vaccination programs to combat clostridial infections and respiratory ailments. The health plan cattle are subjected to varies among markets. Data collected on cattle marketed last year indicated that the health plans did alter the incidence of treatment among marketed cattle. Issuing vaccines and bactrins likely provided the added edge an animal needed to avoid severe illness so that death losses were also influenced by health plan. The incidence of treatment among cattle marketed through special sales appeared to be lowest among cattle treated with Health Plan IV. Death losses tended to be the lowest among cattle given Health Plans I, IIA and IV. Based on the information gleaned so far, Health Plan IV seemed the most effective in combating disease among market cattle. Health Plan IV was related to the lowest incidence of sickness as well as a low incidence of death among cattle sold through special sales.

Table 4 provides information on the number of cattle treated and death rates among marketed cattle as related to the purchaser's assessment of their general condition after shipping, observation of signs of disease among animals the mixing of purchased groups with other cattle upon arrival and whether or not cattle were processed (vaccinated, treated for parasites, implanted, etc.) after arriving at their final destination. Cattle which were classified as being "fresh" upon arrival were much less apt to be treated than those classified as being "slightly depressed" upon arrival. The death loss data only shows a slight trend towards more death loss among groups classified as slightly depressed. These data, however, may be somewhat biased since the condition of the cattle was not consistently assessed the day cattle actually arrived at their final destination. Buyers may have had a tendency to classify cattle as being in worse condition retrospectively after a high number of the cattle required treatment.

Data in Table 4 also shows that mixing animals following shipment affected their survivability. No influence was seen on treatment incidence as influenced by mixing. Intensifying stress and exposing cattle to additional infectious agents by mixing animals from different groups upon arrival also has been reported by others to increase the severity of an illness and/or reduce an animal's chances for recovery from an infection.

Table 5 summarizes the times at which cattle were processed following arrival at their final destination. The timing of processing had a significant influence on the number of cattle requiring treatment but not on the death loss rate. Postponing the processing of cattle for more than 24 h after animals arrived seemed related to a greater incidence of treatment among the cattle. However, the extreme variation and the relative small numbers in each category, the variation among the survey responses themselves and inconsistencies among the overall means made it very difficult to interpret the information obtained on the effect of the time of processing on the incidence of sickness or death among shipped cattle.

Age and size of cattle are related to the ability of the animal to resist disease. Older or larger cattle tend to have greater resistance to disease and its affects than younger cattle. Table 6 contains data showing the incidence of treatment and death among cattle of various weight categories. Considerable variation existed among the data and the actual numbers of cattle observed varied considerably among the weight classes. Statistical analysis indicates only a trend towards more treatments for smaller cattle. A strong statistical correlation is, however, present for the influence of weight on death loss. The incidence of treatment and death appeared to be greatest among cattle weighing between 300 to 500 pounds.

This study provides some important findings for both producers and buyers of Virginia feeder calves. An additional survey effort now under way for the fall of 1988 marketing season will attempt to reconfirm these findings to strengthen confidence in them. It will also focus on areas such as differences among markets, where calf numbers in 1987 were likely too small to really detect any relationship. The number of data obtained on marketing conditions (crowding, take-in times, air quality, feed and water availability) were too few in 1987 to be summarized. Additional data collected in 1988 will hopefully provide sufficient information to allow for making some conclusions in these other areas.

TABLE 1. SIMPLE REGRESSION ANALYSIS (Y = AX + B) EVALUATING THE RELATIONSHIP BETWEEN EACH MARKET FACTOR AND THE INCIDENCE OF TREATMENT OR DEATH AMONG CATTLE MARKETED IN VIRGINIA[a]

	Dependent variable (Y)	
Independent variable (X)	Number of cattle treated	Number of cattle dead
Market	NS	NS
Health Plan	****	***
Type of sale: special, direct, or weekly	***	**
Number of cattle in group	****	NS
Number sick		NS
Number dead	NS	
Condition on arrival	****	*
Signs of disease on arrival (yes/no)	***	***
Processing (yes/no)	*	**
Timing of processing	***	NS
Shrink	**	NS
Mixing	NS	***
Weight	**	****

[a]NS = nonsignificant
*P<.3
**P<.1
***P<.05
****P<.01

TABLE 2. INCIDENCE OF TREATMENT OR DEATH AMONG CATTLE SOLD BY DIFFERENT MARKET METHODS

Method of Marketing	Number of Cattle	% Treated	% Dead
Special	4167	10.8	.38
Direct	982	3.4	1.22
Weekly	1478	9.9	2.03

TABLE 3. THE INCIDENCE OF TREATMENT AND DEATH AMONG CATTLE VACCINATED USING DIFFERENT HEALTH PLANS

Item	Number of Cattle	% Treatment	% Dead
Health Plan I[a]	1765	9.9	.28
Health Plan II[b]	789	10.8	.76
Health Plan 1A[c]	446	10.1	1.12
Health Plan IV[d]	486	4.5	0.00
Health Plan IIA[e]	825	16.5	0.00

[a]I = 7-way 0-50 d.
[b]II = 7-way, IBR and PI3 14-50 d.
[c]1A = 7-way, 0-50d, IBR and PI_3 at market.
[d]IV = 7-way, IBR and PI_3, Haemophilus, Pasteurella 14-50 d. Boost Haemophilus and Pasteurella.
[e]IIA = 7-way, IBR and PI_3 and Haemophilus 14-50 d. Boost at market.

TABLE 4. INCIDENCE OF TREATMENT AND DEATH AMONG CATTLE AS AFFECTED BY THE CONDITION OF THE CATTLE AFTER SHIPPING, MIXING SHIPPED CATTLE WITH CATTLE FROM OTHER SOURCES AND THE PROCESSING OF CATTLE AFTER SHIPPING

Item	Number of Cattle	% Treated	% Dead
Condition after shipping			
Fresh	5162	6.7	.85
Slightly depressed	1342	20.2	1.04
Mixing animals upon arrival			
Mixed	4519	10.2	1.11
Not mixed	2109	8.2	.38
Processing after shipping			
Processed[a]	3915	9.1	.54
Not processed	2712	10.1	1.36

[a]Vaccinating, treatment with antibiotic, treatment for parasites, implanting, etc.

TABLE 5. INCIDENCE OF SICKNESS OR DEATH AMONG CATTLE PROCESSED AT DIFFERENT TIMES AFTER SHIPPING

Time After Arrival	Number of Cattle	% Sick	% Dead
Off truck	589	7.3	.85
2-12n	2515	5.6	1.43
12-24h	232	4.31	2.6
1-7d	291	19.6	.34
>7d	631	4.5	.17

TABLE 6. THE INCIDENCE OF TREATMENT OR DEATH AFTER SHIPPING AMONG CATTLE OF VARIOUS WEIGHT CATEGORIES

Weight (lbs)	Number of Cattle	% Treated	% Dead
<300[b]			
300-350	66	12.1	9.1
350-400	399	11.0	4.0
400-450	166	5.4	4.8
450-500	455	7.3	0.0
500-550	944	9.6	.11
550-600	1257	7.7	0.0
600-650	834	7.2	.12
650-700	145	2.8	2.1
>700	198	12,1	.51

[a]Individual weight information was obtained for only 4,464 head of the 6,627 head of cattle that were evaluated during the study.
[b]Missing data

The Beef Cow Deworming Controversy

Dr. W.Dee Whittier, Extension
Veterinarian, Cattle
VA-MD Regional College of Veterinary Medicine

The development and widespread availability of products to kill internal parasites or worms in cattle has provided a great need for information on how, when and where to use them. In no area does more disagreement exist about their use than in the mature beef cow.

General facts on internal parasites

Virtually all cattle harbor some digestive tract worms. Generally these worms are quite small and so are only noticed with careful examination at slaughter or autopsy. The adult worms and later developmental stages live in the cattle. The adults lay eggs which are passed in the manure. After the eggs hatch there are other developmental stages before the immature worms or larvae crawl onto the grass. When grazing cattle eat the larvae the cycle is complete. While the life cycle of the worms has been known for some time there is some important more recently acquired knowledge about the worms. 1) Approximately 95% of the total number of worms present in most settings are on the pastures while only 5% of the worms are in the animals. 2) The parasite larvae survive for long time periods on pastures. A pasture would have to go ungrazed for at least two years before most worm larvae would die. 3) Winter weather conditions do little to destroy larvae. Hot, dry weather will destroy larvae on grass but ones in manure pats may be protected for some time only to reappear on pasture when rain returns. 4) Pasture larvae numbers tend to be lowest in early summer and increase in midsummer through fall.

Heavy infections with worms may produce outward signs of disease: usually diarrhea, a rough hair coat, loss of weight and thriftiness. Very often, however, infection levels are such that outward signs are not seen.

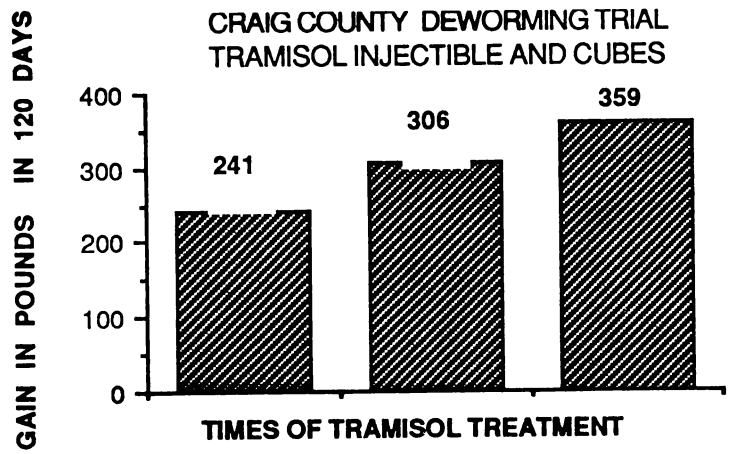
In young cattle successfully controlling worms has nearly always produced increased gains during the grazing season. It should also be noted, at this point, that there are many causes for diarrhea, weight loss and unthriftiness other than parasites.

Timing of deworming

With the above facts in mind a few points on the timing of deworming can be made. Since a large percentage of total worm numbers live outside the animal tremendous potential for re-infection following deworming exists. Young cattle deworming trials in Virginia have shown that a single spring deworming treatment generally fails to provide long-term worm control. The concept of strategic deworming has been used to overcome this. Cattle get 3 deworming treatment as they begin spring grazing. This is timed to coincide with the three week time of larvae development from consumption by the animal to egg laying. With Ivomec® a treatment at turnout followed by one additional treatment at 5 weeks is used.

Yearling cattle deworming trials have been repeated many times in Virginia in the last 5 years. Different products have been used and the use of different ways to deliver the medications has been studied. In nearly every case cattle gained extra pounds compared to cattle on adjacent pastures that only got one treatment at turnout. The graph below shows cattle weight gains in a 1988 season

trial done in Craig county, Virginia. Calves were divided into 3 groups and grazed separately. All groups were given injectable levamisol at turnout. One group was retreated with levamisol (this time in dewormer cubes administered on pasture) at 3 and 6 weeks after turnout. The other was retreated with the cubes only once at mid season. The graph shows drastic differences in total gain based on the deworming programs.



The beef cow and deworming

With all of the above considerations we now address the question of deworming the beef cow. There are experts who advocate the practice and experts who discourage it. Their basic arguments will be summarized in this section.

Factors supporting beef cow deworming include:

1. All groups of cows have some worms. Basically any group of cattle that grazes will have some animals with at least some internal parasites.

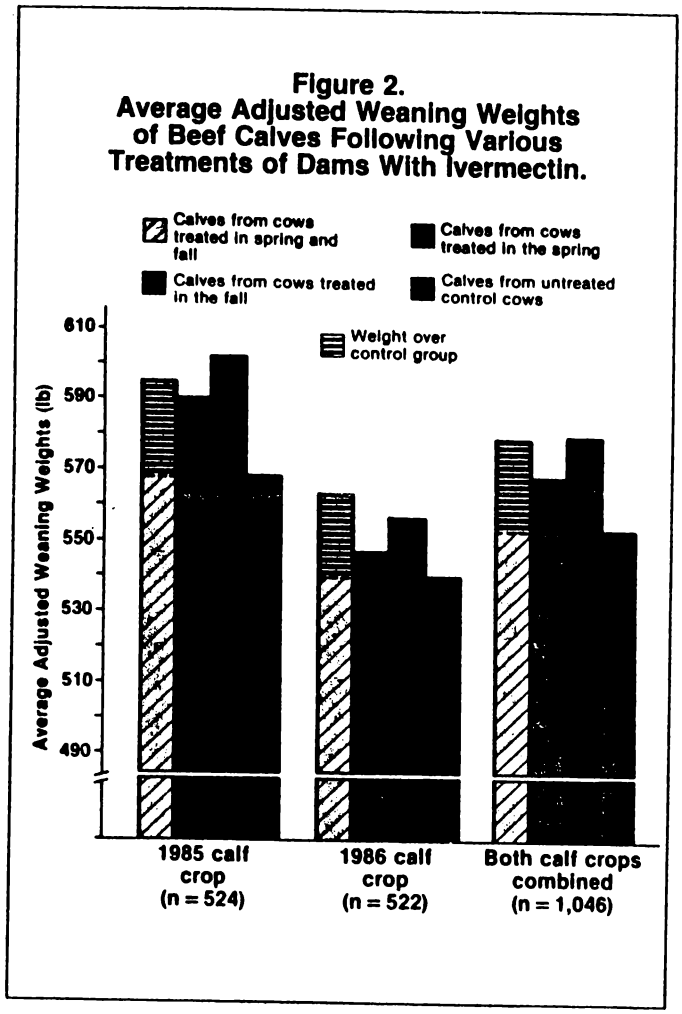
2. The potential for cows infecting their calves exists. Eggs shed by cows will develope into larvae and be available to be grazed by calves as soon as they begin grazing.

3. Some studies have shown a benefit to deworming cows. I carefully chose the word some. I have decided that the hazards of counting the number of studies on each side of the question or trying to assess the scientific merit of them are greater than I dare risk. I choose instead to cite a study which has been widely published and discussed.

   This field study was conducted by K. Wohlgemuth at North Dakota State University and J.J. Melacon of MSD AGVET (Merck). It involved 4 herds of cows over a two year period in 1985 and 1986. The summary of the published study is as follows:

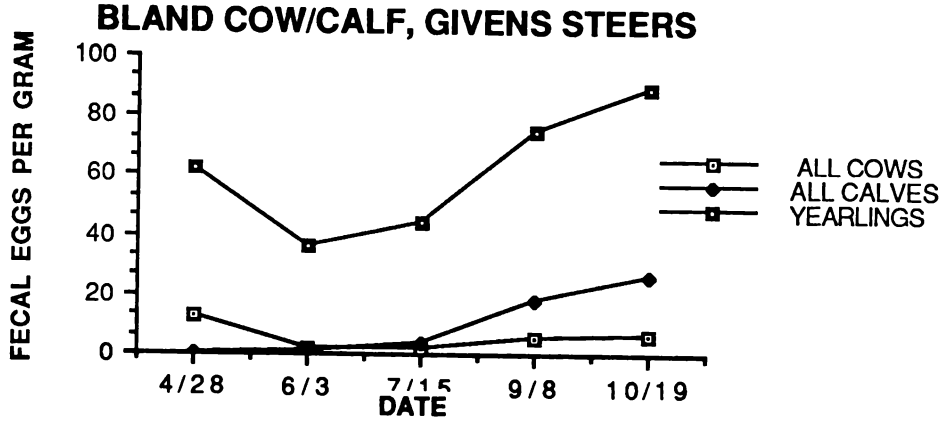
A two-year field study was carried out in North Dakota to determine what effect, if any, parasitic treatment of beef cows with ivermectin had upon weaning weights of their calves. Four herds, totaling 548 cows during the first year and 522 cows during the second year were used in the study. Each herd was divided into four groups as follows: Group A- treated with ivermectin during spring and fall; Group B- treated only in the fall; Group C- treated only in the spring; Group D- untreated control. A total of 1,046 calves were weaned during the 2-year period; the individual weaning weights were recorded, adjusted to 205 days of age and comparisons were made for adjusted weaning weights of all groups in all herds. There was a significant advantage ($p=0.02$) of 15.5 lb in adjusted weaning weights of calves from treated cows over calves from control cows.

It should be noted that fall dewormed and control cows were pastured separately from spring/fall and spring dewormed cows. All cows were wintered together. Fecal samples were collected on 10% of cows the first year at the start of the trial. From 8% to 40% of the cows had "positive" fecal samples. Numbers of eggs seen were not reported. No significant difference in pregnancy rates was seen. The graph below shows the weaning weights for the various groups. Note that calves from the group treated in the fall were lower than the spring and spring/fall groups in each case suggesting a difference in pasture quality in the fall/control pastures.



Factors against beef cow deworming include:

1. Number of worms and worm eggs shed by cows is much lower than for young cattle. The graph below shows levels of eggs for cows and calves on our study compared to yearling age cattle eggs from another study the same year.



2. Because of age and past exposure cows have great immunity to worms. This includes the capability of inhibiting development of grazed larvae into adults and inhibition of the ability of adult worms to lay eggs. Worms also have a decreased ability to physically affect adult cows.

3. Other factors than worms can cause decreases in thriftiness, performance and diarrhea. The temptation is to classify every thin or dirty-tailed cow as being wormy. Cows with Johne's disease have poor thrift and diarrhea. Lab tests on suspect cows often fail to show a worm burden.

4. Strategic deworming programs to influence pasture levels of worms would be very expensive with cows. Remember that a large percentage of the total worms are on the pastures at any time and that a single deworming in the spring or fall does little to change that. Three times deworming as recommended for yearlings would be too costly and **has never been recommended by our group.**

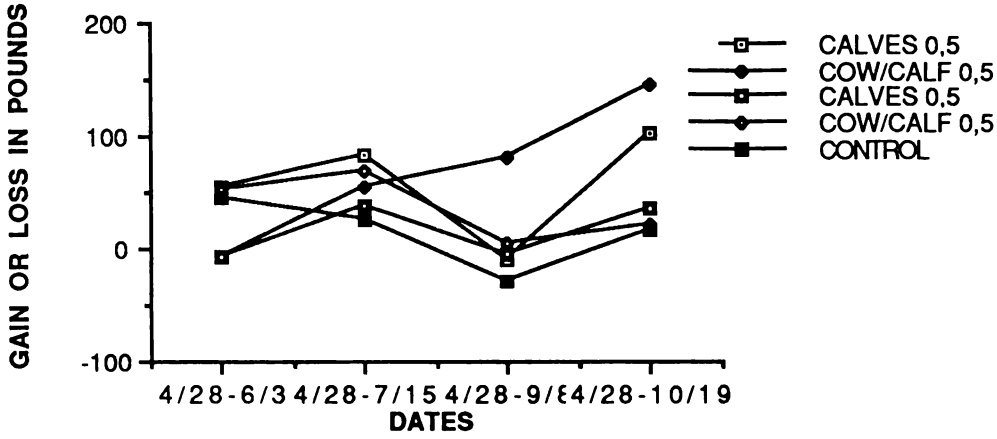
5. Cows may naturally protect calves because they graze up over-wintered larvae in the spring and stop their development. These larvae are then not available to infect and propagate in susceptible calves.

6. Some (again a carefully chosen word) studies have shown no benefit to deworming cows.

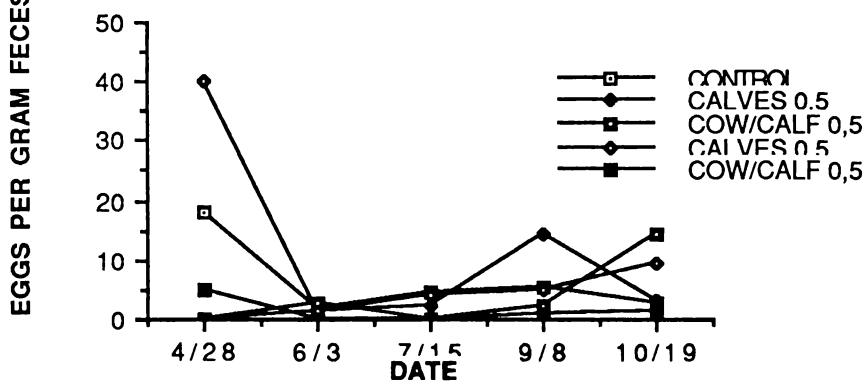
I cite a field study conducted by myself, Dr. Jorgen Hansen and Dr. Anne Zajac of the VA-MD Regional College of Veterinary Medicine at Virginia Tech in 1987. One hundred twenty-five cows were involved in the study and were divided into five groups. All groups were grazed separately during the course of the study. Two groups of the cows and calves were treated at the beginning of the grazing season and five weeks later with Ivomec®. In two groups only the calves were treated with Ivomec® at turnout and 5 weeks later. The fifth group was a control and received no treatment at any time during the trial. All cows and calves were weighed at about one month intervals throughout the grazing season. At weighing times samples from a random number of cows and calves from each group were taken for fecal egg counts and to do serum pepsinogen measurements. Serum pepsinogen is used to measure the amount of tissue damage being done by parasites at any time.

Shown below are graphs of the various measurements taken. Even though minor differences can be seen none of these differences are significant as judged by statistical tests. Our conclusion was that even this very elaborate and expensive parasite control program did not influence the amount of parasite damage or affect calf weight gain.

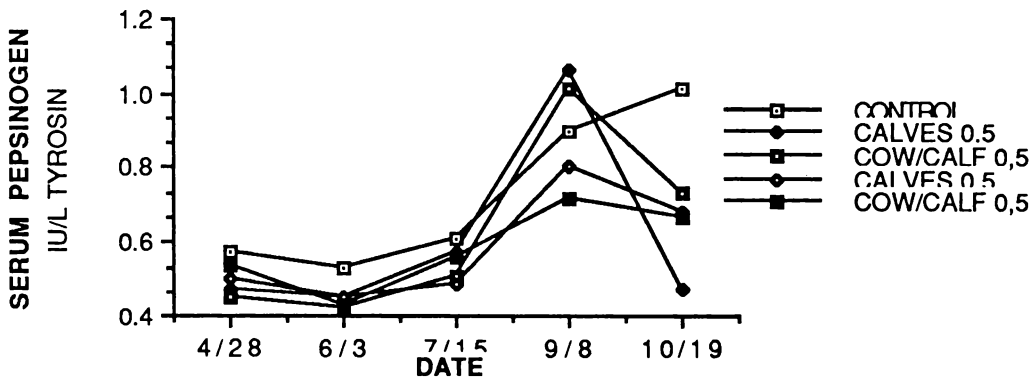
COW WT GAINS- BLAND 1987



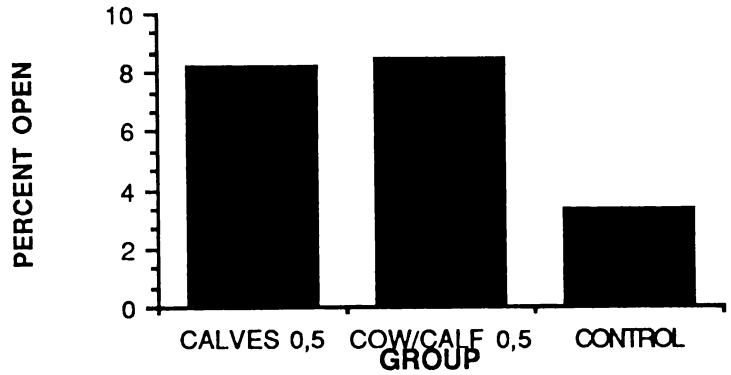
BLAND COW FECAL EGGS

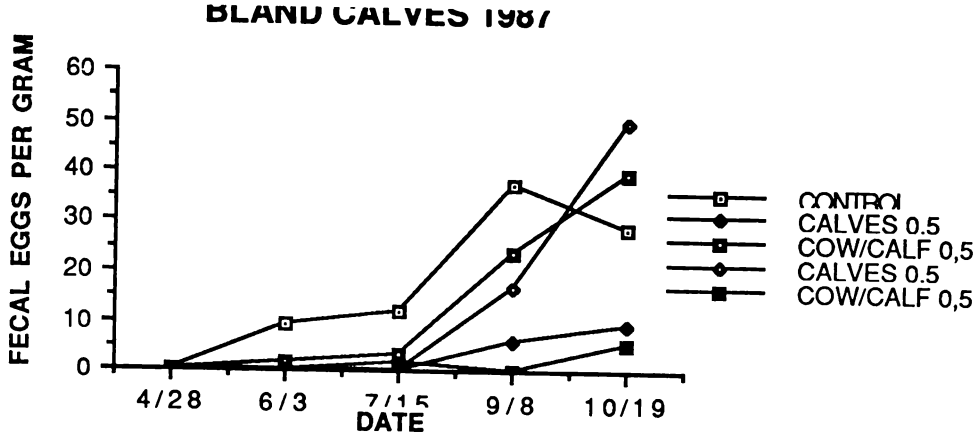


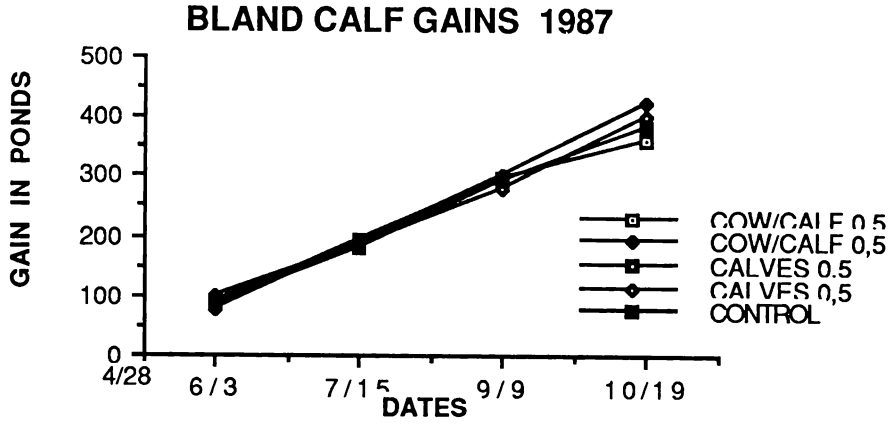
BLAND COW/CALF 1987



BLAND PREG CHECKS 1987







In the end the decision about whether you deworm cows or not will have to be your own. There is evidence on both sides of the question. Careful consideration of the evidence is urged before you decide whether to spend dollars in cow deworming. Strategic deworming programs are encouraged for all stocker calves and replacement heifers.

PRODUCING CATTLE THAT ARE IN DEMAND

By James Bennett
Knoll Crest Farm

Two things we beef producers have always guarded are: tradition and independence. We can be proud that we have avoided quotas and controls on our beef production. The beef industry is the best example in production agriculture that supply and demand will work. Today with cow numbers down and prices up, it is not hard to rededicate ourselves to this philosophy. As for tradition, I see this as one of our greatest handicaps in beef production. Ask the question: Why are you producing a certain breed of beef cattle on your farm?; and you will get many different reasons, but many of them will be based on tradition. Somehow **tradition** could be a greater force in Virginia beef production than **opportunity.**

Certainly, any of us should be able to raise or maintain beef cattle on our farm for whatever the reason we have, this is the part of the independence we enjoy. My concern is that we do not take beef cattle production in Virginia as **serious** a business as we do many of our other commodities. Let me remind you that the sale of cattle and calves in Virginia ranks No. 1 of all our agriculture commodities. We generate about $300,000,000.00 income annually that ranks us No. 1.

Before we can address the needs or opportunities in Virginia commercial cattle industry, we need to answer one question. What is the **main objective or purpose of our beef industry in Virginia?** Even as a life long member of this group I had much rather define the purpose of about any other agriculture commodity group. Just think about it--it is not hard to know why we produce tobacco, dairy, pork, poultry, corn or peanuts, they are produced for a **profit.** But, to often our beef cattle production on a farm is something we let just happen. We graze cattle in Virginia on land that would probably have a value range from $100.00 to $10,000.00 per acre. Putting all of the cost against an animal unit we probably would get an annual, per animal unit, cost range from $50.00 to $5,000.00. Just think, the addition of a fly tag in the lesser cost animal would increase her annual cost 2%, but you could use a fly tag in the more expensive animal without getting out your pencil, unless it would deface her. Now for the fungus fescue problem, here is another case where the extremes are no problem, you just suggest the lesser cost producer see the economist, to learn he cannot afford to renovate his pastures, while the greater cost producer sees the agronomist, to learn the best method to renovate his pastures. Somehow we have tried to design and sell a beef program in Virginia that meets the needs of the average breeder and there ain't none.

When we address the subject "Producing the cattle the market wants," here again we are caught between tradition and opportunity. Traditionally, Virginia has operated with a rather limited market, therefore, we have had some limitation on the kind of cattle we could best market. Today, we are facing a changing market and this we need to view as an opportunity. With the use of satellite communications, tela-auctions and the desire for leaner beef, we have the tools to work with and a goal to shoot for.

Cross breeding is another opportunity to better meet our goal of lean beef. The lack of crossbreeding in our Virginia commercial beef industry is the best evidence I have that we are not receiving the maximum profit from our Number 1 business in agriculture. For years crossbreeding has not received much promotion or even discussion in Virginia.

As I put these thoughts together while sitting in an airport in Bismark, N.D., I am very much aware we could learn a lot from these cattle producers in this northwest country. For the past 7 days I have traveled about 1500 miles in North Dakota, Montana, Wyoming and South Dakota. I have attended 3 purebred cattle sales, visited several ranches, stopped by two stock yards, talked with many cattle people and seen thousands and thousands of cattle in my traveling.

After this week I am convinced the people of this country have a common goal or purpose in beef cattle production and that would be they produce them for a profit. In order to maximize profit they know they have to crossbreed. I intentionally looked for cattle that would be considered straightbred cows and calves--never did I find the first herd other than seedstock or purebred herds. At one of the sale barns they had a computer printout of 2735 calves for sale that day. This printout had listed the owner, breed of cattle, sex, number of head and weight. Of these 2735 calves, there were 33 straightbred heifers and 6 straight steers--all the rest were crossbred. If our purpose for the beef industry in Virginia is for profit, crossbreeding should be as much a part of our plan in commercial beef production as it is in the Northwest cattle country. Closer home we can learn from the poultry or pork industry for the same hybrid vigor works for them that would work for our beef industry.

Crossbreeding without a plan in all cases is not an advantage. Each breeder has certain needs and opportunities that should be considered when developing a crossbreeding plan. A "this year" plan is not adequate, instead, plan for several generations of cattle and know where you are going in order to keep it within your needs and to maximize profit. Today the breed associations have the technology that allows the purebred breeder to breed cattle that will best meet the needs of his customer. With the many breeds we have to work with and the range within breed our opportunities are greater than ever to develop a profitable, planned crossbreeding program. Just think if we could increase our production just 10%, that would increase our income about $30,000,000.00 in Virginia.

MARKETING FEEDERS FOR THE MOST MONEY

BY: Richard C. White, Extension Agent
Farm Management, ECD

MARKETING rather than just **SELLING** feeder calves, can mean more money in your pocket. Marketing means, making an informed decision based on statistical information to decide when, where, and to select the most advantageous marketing method. On the other hand, selling is simply loading up your calves when it convenient for you and delivering to a sales point to take whatever price that the buyers present are willing to pay at that time.

One factor which contributes to many Southside producers just "selling"; is the fact that most of us are primarily cash crop producers who just happen to have 20 or so beef cows on the farm. Hence, we do not manage the cattle enterprise nor do we manage our marketing because we consider our cattle only as a "side" or supplemental enterprise. Often our primary purpose to even having cattle on the farm is to keep the grass and weeds down on those fields or areas of the farm which aren't suitable for field cropping. Too often, we let convenience of movement or when our grass is getting short or when we need a little pocket money, be the deciding factor of when we sell our feeders. Beef cattle **can be another profit center** on our farm if we decide to manage the production and marketing of our product more effectively. We should adopt many of the production management practices that have been outlined during this meeting as well as give more consideration to "marketing" our cattle, rather than just "selling".

Marketing cattle for the highest dollar involves deciding when and what sales method to use to market the cattle in order to receive the most money per head. Let's discuss when to market based on information as to price for a minute:

When should we market our cattle, based on historical price information?

Please refer to TABLE #1 "Average Prices Received by VA Farmers for Calves: Dollars per Hundred Pounds, Live Weight". 1/ Note that this table is a statewide average of prices received at regular auction sales for ALL "calves" which is all cattle that weigh less than 700 pounds. Note that the "average prices per month" 1980 to 1988 in the right hand column of the table shows a sizable spread between different seasons. There are 3 or 4 months during which we will historically receive less money per

cwt than during other months. This fact is demonstrated graphically in CHART A. The broken line at 100% represents the seasonal average. When the graph line goes up to 107% in May, it demonstrates that buyers want cattle and bid the price up at this time of year. This peak in price reflects supply; maybe we could change our marketing to increase the supply and receive a higher price at the same time.

Where (what marketing method) can we use to market our calves so that we receive the highest price?

Where, or what marketing method we use should be determined by the appraisal of where can we get the most exposure for our cattle to the largest number of buyers. I think that it is safe to say that the largest number of buyers on any market is represented on the "pooled" sales. Pooled sales such as the "Special Graded Feeder Sales" attract as many as 25 or more buyers on the phone or in the barn. Usually these buyers are also the "users" of the cattle that they bid on, hence, no middle men are involved.

Since these buyers are specialized users of cattle, they want larger uniform lots of sexed, graded and similar weight cattle, than most operations in Southside Virginia can put together on an individual farm basis. Hence, pooled sales offers us, as producers, the opportunity to respond to these specialized buyers' need for larger lots of uniform cattle.

Please see TABLE #2; "Comparisons of prices received on Regular Auction Sales and Special Graded Feeder Sales, by Seasonal Sale Periods"; which demonstrates the probable price advantage for marketing through pooled sales. Many pooled sale opportunities are available through the Special Graded Sales and Tele-auction Sales. Note that Table #2, is standardized and lists prices received for 5-600 pound and 7-800 pound Large/Medium #1 & 2 steers.

At what weight should we be selling our cattle?

During most of the years represented on TABLE #2, when we compare prices that we would have received in the spring following the price we sold at in the fall, in most instances, it seems that we should have kept those lighter calves and turned them into 700 pound feeders. Of course, factors such as forage available, cash flow or others have an influence on when we market our cattle, <u>but</u> we can probably work around most of these problems <u>if</u> we try.

The current price looks good, I don't want to take a chance on next spring's price.

Fluctuations in cash price are a real concern but there are also **price risk management tools** available for Southside producers. The Futures and Options Market through the Chicago Board of Trade allows us to **hedge** by trading a contract for 44,000 pound of feeders. Another tool available is a **floored forward cash contract** through the Forward Pricing Incorporated; a private corporation which will price the forward cash contract price for as few as 10 head of feeders. Forward Pricing Incorporated uses the futures and options market and sales information that VPI & SU researched to offer a forward cash contract price which is a floor under the price you can expect to receive for later sales of cattle. There isn't time now to explain hedging on CBT or the workings of the Forward Pricing Corporation, but more information may be obtained by contacting your local Extension Agent or Farm Management Agent. I strongly recommend, that if you intend to over-winter cattle, you examine and use one of the marketing tools available to reduce cash market price risk.

In summary, **marketing** cattle versus just **selling** your cattle will return you $25 to $40 more per head. Choosing the best time of the year, best marketing point and reducing price risk are important factors for **increasing net profit** from your cattle herds. Use the historical price information available and base your marketing decisions on facts rather than guesses in order to realize the increased net profit from your beef enterprise.

TABLE #1

PRICES RECEIVED BY VIRGINIA FARMERS

(Dollars Per Hundred Pounds Live Weight)

MON	1980	1981	1982	1983	1984	1985	1986	1987	1988	AVG PRICE FOR MONTH 80-87
JAN	84.00	61.20	50.10	55.30	54.60	52.30	52.20	56.50	79.10	60.59
FEB	90.00	66.20	50.40	59.90	58.20	56.90	56.70	62.10	84.60	65.00
MAR	79.20	63.10	55.80	62.50	56.90	58.30	57.70	63.40	86.30	64.80
APR	75.00	64.40	55.80	61.20	55.30	59.90	56.10	70.80	89.99	65.38
MAY	74.00	60.60	57.10	61.40	53.20	59.50	53.10	73.60	86.90	64.42
JUN	76.00	58.40	55.70	59.50	49.90	55.80	50.60	72.20	77.80	61.77
JUL	73.00	54.90	51.20	52.90	50.10	51.90	52.00	71.50	72.60	58.90
AUG	77.40	53.50	54.20	48.40	52.60	53.80	54.60	73.10	81.20	60.98
SEP	75.60	53.60	52.40	48.30	53.40	53.00	58.10	75.90		58.79
OCT	73.00	52.20	51.60	51.10	50.30	54.80	57.90	74.50		58.18
NOV	72.00	49.50	48.60	49.70	49.40	53.30	53.60	71.60		55.96
DEC	72.30	47.90	49.40	50.80	49.30	51.20	53.80	74.00		56.09
SEASON AVG.	75.50	56.10	52.60	54.30	52.60	55.10	55.50	71.10		

SOURCE: VA AGRICULTURAL STATISTICS; Compiled by VA Agricultural Statistics Service of VADACS.

CHART A
SEASONAL PRICE INDEX: CALVES
Average Virginia Farm Price, 1974-1984

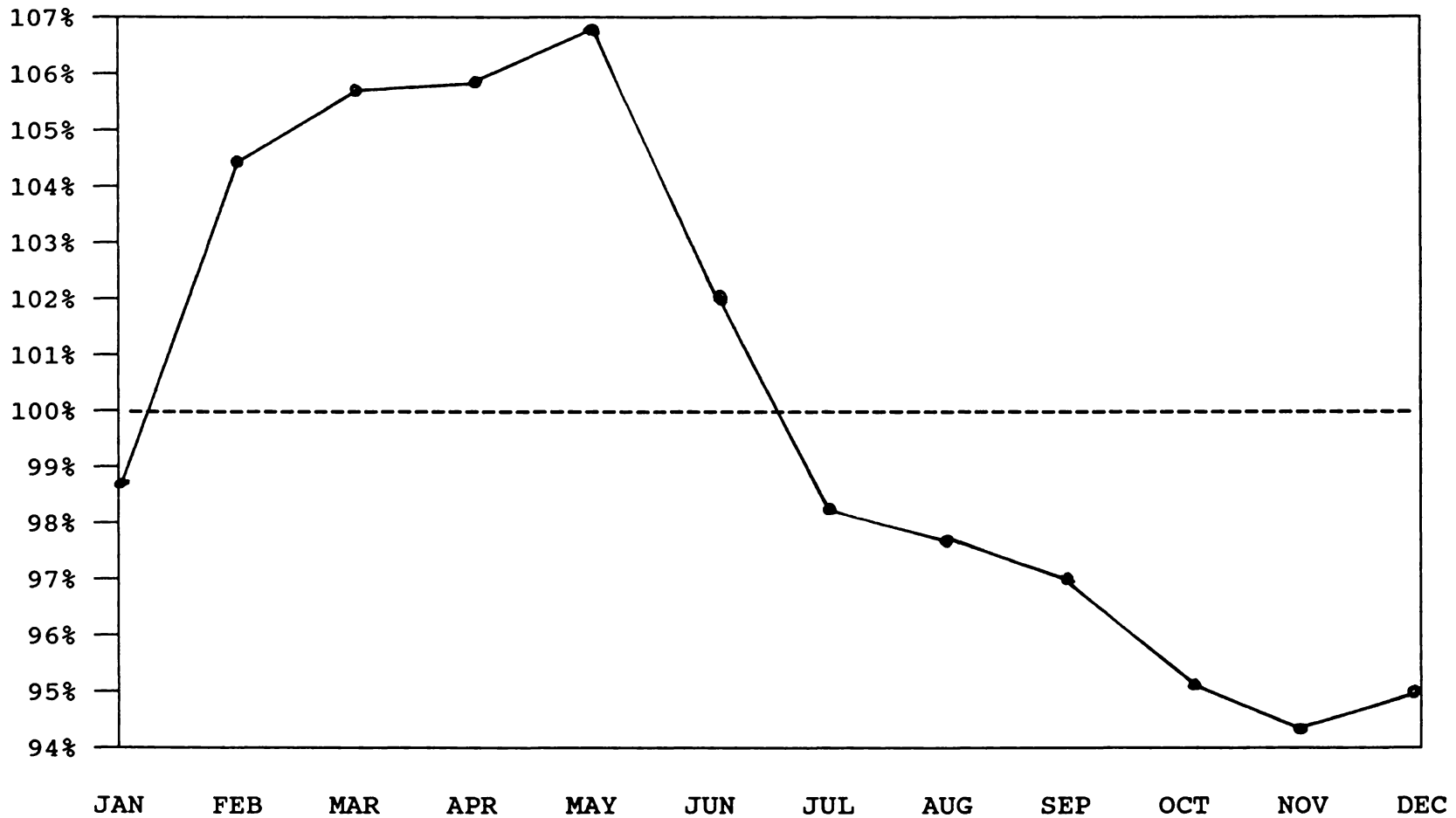


TABLE #2

COMPARISONS OF PRICES RECEIVED ON REGULAR AUCTION SALES AND SPECIAL GRADED FEEDER SALES BY SEASONAL SALE PERIODS

YEAR AND SEASON a/	AUCTION SALES a/ 5-600	SPECIAL GRADED SALES b/ 5-600	AUCTION SALES 7-800 a/	SPECIAL GRADED SALES b/ 7-800
1983 SPRING	68.17	71.63	60.50	63.22
FALL	55.03	57.31	52.36	53.85
1984 SPRING	64.10	64.34	58.58	59.12
FALL	58.25	60.85	55.69	58.70
1985 SPRING	65.63	69.58	58.49	60.78
FALL	58.80	60.98	54.74	56.64
1986 SPRING	63.13	63.95	53.89	54.55
FALL	60.92	63.44	57.81	60.18
1987 SPRING	72.62	76.17	64.34	67.84
FALL	78.50	80.70	70.48	73.40
1988 SPRING	90.95	94.17	76.02	75.28
AVERAGE OF MARKETS 1983-1988	66.01	69.37	60.26	62.14

SOURCE: VA AGRICULTURAL COMMODITY NEWSLETTER: Prepared by Agricultural Marketing Service, VADACS.

a/ Average range of prices reported in "Summary of Livestock Auctions by Area" for L&M, 1 & 2 steers by weight ranges.

b/ Average range of prices reported as "Special Graded Feeder Cattle Sales" for L&M 1 & 2 steers by weight ranges.

VIRGINIA FENCING LAW

A synopsis of a paper by Geyer and McLaughlin

Presented by Jack Dunford
Farm Management Agent
Culpeper, VA

The information which follows is not intended as a substitute for the advice and counsel of an attorney. In fact, if specific disputes arise over the law or if such a dispute seems likely, an attorney should be consulted.

Questions Landowners Ask

What are the duties of Virginia citizens to maintain "lawful" fences? What is a lawful fence in Virginia? Who is responsible for repairing and keeping up a fence in Virginia? Can you require your neighbor to share in the upkeep or the installation cost of a fence? What can you do to prevent someone's cattle from entering your land or to recover damages should this occur?

Duty to Control Animals

Fences are treated in law as guards against intrusion, particularly for the purpose of preventing cattle or other domestic animals from going astray or for protecting a field or property.

Virginia statutes have specific provisions allowing recovery for trespass by animals if they cross lawful fences within the state and cause damages by their trespass. This particular legislation is designed to apply to horses, mules, cattle, hogs, sheep, or goats. Should any of these animals enter into grounds that are enclosed by a lawful fence, the owner or manager of the animals is liable for the damages incurred by the owner of the property. The legislation further provides that for each succeeding trespass, the owner or manager of the animals shall be liable for double damages.

This particular legislation may not apply the same throughout all counties within the state. Virginia statutes specifically define lawful fences, but in some counties or portions thereof, the boundary lines of all tracts of land may have been constituted lawful fences by act of the Board of Supervisors. If so, this means that in these areas there is an absolute duty of owners of animals to prevent their crossing onto the lands of another. Therefore, one should exercise caution in applying the general rule and should determine specifically whether in a particular county or portion of the counties, all boundaries are considered to be lawful fences. Under the "Common Law", a livestock owner

has the duty to keep his animals on his own land, and is responsible for any damages they may cause. However, in Virginia, the general rule or law puts no duty on the owner to restrain his stock (unless they are known to be dangerous). In some counties, the cattle may stray onto another's land, and the owner is not responsible for any damages that occur. It is up to the non-livestock landowner to erect a "lawful" fence in order to keep the stock off of his land. If the animals cross this lawful fence, the landowner may recover for trespass or damages. The cost of building and maintaining this fence must be split evenly when required under the division fence statues.

In situations where a lawful fence has been crossed or in those counties where any boundary line is considered to be a lawful fence, recovery may be had for any type of entry if damages result. Naturally, recovery in the form of damages is not automatic in that if the owner of the animal refuses to pay, then a court action may be necessary.

An optional method of handling trespass into enclosed grounds is that the owner or the tenant of the enclosed grounds has the right to take up and impound the trespassing animal until damages have been paid. Within three days of taking up and impounding the animal, the owner or tenant of the enclosed grounds must apply to the General District Court of the county in which the land is located for a warrant for the amount of damages claimed. Once application is made to the court, a warrant can be issued and the matter can be set for hearing. After the hearing the judge can order whatever damages are deemed to be just and proper in the case. Normally, if the court finds that damages have been sustained, the cost of taking up and impounding the animal may be recovered in addition to reimbursement for the damages caused to the property.

This provides a specific statutory remedy for those whose property is damaged by the trespass of animals. One should keep in mind that any such action under this procedure must be started within three days of the time the animal is impounded.

It should be noted that while landowners are under a duty to make their premises safe for trespassing animals, they may not intentionally harm them.

For example: Farmer Cattle's bull jumps the fence between Farmer Cattle's and Farmer Crop's land. He continues to do so on three or four occasions per week for two weeks. After repeatedly returning the bull to Farmer Cattle, Farmer Crop decided to do something about it. Farmer Crop digs a hole in the ground and places leaves and hay over it. The bull drops in the hole the next time that he jumps the fence. Farmer Crop would be liable for the damages as he intentionally harmed the bull.

Fence/No-Fence Counties

As previously indicated, certain counties may have adopted an optional fencing provision which is generally referred to as the "no fence law." In those counties, the Board of Supervisors, after proper notice, may have declared the boundary line of each lot, or tract of land, or stream within the county, or district within the county or any portion of the county to be lawful fence. If so, it then becomes unlawful for the owner or manager of any horse, mule, cattle, hog, sheep, or goat to permit any such animal to run at large beyond the limits of his own land. This puts an absolute duty on the owners of animals to restrain them or fence them in.

The status of the fence/no fence law of the counties in Virginia is shown in the following tables. The information provided was obtained from the counties in response to a survey conducted by Geyer and McLaughlin during the summer of 1986. The response was from the county administrator or other appropriate person. If you have any questions concerning your county, contact your county administrative offices.

Table 1 - No-Fence Counties

Counties/Cities that have "declared the boundary line of each lot or tract of land, or any stream in such county . . . or any selected portion of such county to be a lawful fence":

Albemarle	Floyd	Lee	Rockingham
Arlington	Fluvanna	Louisa	Scott
Augusta	Frederick	New Kent	Smyth
Bedford	Greene	Orange	Stafford
Botetourt	Halifax	Page	Warren
Buckingham	Hanover	Patrick	Washington
Campbell	King & Queen	Pittsylvania	Wise
Clarke	King George	Pulaski	Wythe
Cumberland	Loudoun	Roanoke	York

Table 2 - Fence Counties

Counties/Cities that have not "declared the boundary line of each lot or tract of land, or any stream in such county/city . . . or any selected portion of such county/city to be a lawful fence":

Accomack	Culpeper	Highland	Powhatan
Alleghany	Dickenson	Isle of Wight	Prince Edward
Amelia	Dinwiddie	James City	Prince George
Amherst	Essex	King William	Prince William
Appomattox	Fairfax	Lancaster	Rappahannock
Bath	Fauquier	Lunenburg	Richmond
Bland	Franklin	Madison	Rockbridge
Brunswick	Giles	Mathews	Russell

Buchanan	Gloucester	Mecklenburg	Shenandoah
Caroline	Goochland	Middlesex	Southampton
Carroll	Grayson	Montgomery	Spotsylvania
Charles City	Greensville	Nelson	Suffolk
Charlotte	Hampton	Northumberland	Surry
Chesterfield	Henrico	Northampton	Sussex
Craig	Henry	Nottoway	Westmoreland

The owners and occupants of low grounds on either side of the James River in the counties of Buckingham, Albemarle, and Goochland, need not keep up any fence on the boundary lines running across the low grounds to the river. These boundary lines are deemed legal fences except there public roads cross the river or run parallel with its banks. Lawful fences must, however, be constructed on the back and hill lands.

The boundary lines of any land in any county in Virginia that is under animal quarantine constitutes a legal fence.

Fence/No-Fence Examples

Example 1. Two farmers, Crop and Cattle, live next to each other in Fence County, Virginia. Their county is a "fence" county and, therefore, has not declared the boundary lines legal fences. Neither farmer has chosen to erect a fence. One day, a steer belonging to Farmer Cattle wanders onto Farmer Crop's land and destroys a large quantity of corn. Farmer Crop would be unable to collect for any of the damages because his county, being a "fence" county, follows the Virginia General Law. However, should Farmer Crop decide to build a fence in order to protect his crops, Farmer Cattle must pay half the expenses.

Example 2. Farmer Beef and Farmer Bean live next to each other in Nofence County, Virginia. This is a "no-fence" county, which means that boundary lines have been declared legal fences by the county. One day Farmer Beef received a load of cattle and placed them in a temporary corral that his sons had built earlier that day with three old gates and a spool of rusty fence wire. That night the twine holding the gates together broke, and the cattle escaped. They got into Farmer Bean's watermelon patch and trampled the whole crop. Farmer Beef did not want to reimburse Farmer Bean because he had just spoken to his cousin, Cattle in Fence County, and was told that in Virginia there is no duty to restrain livestock. Farmer Beef did not realize that different counties in Virginia have different fence laws. Because his county was a "no-fence" county, the Common Law rule of the duty to restrain livestock applies. Farmer Beef owed Farmer Bean the full value of the watermelons.

Division Fences

Virginia statutes specifically provide when adjoining landowners shall build and maintain division fences between their land at their joint and equal expenses. The statute outlines when the ownership of the land itself carries within a right to have a division fence on common boundaries of adjacent land or when a duty is imposed to build.

When no division fence has been built, either of the adjoining owners may give notice to the other, in writing, of his desire and intention to build such a fence. By doing so, he can require the adjoining owner to come forward and build his half if required by law. The owner who has been notified of his neighbor's intention has the option to help build the fence or within ten days to notify his neighbor of his intention to allow his land to lie open/and/or if he gives such written notice then the owner wishing to have the fence built has the responsibility of building it himself. However, should the one who has chosen to allow his land to lie open decide at some future time to enclose his own property and thus take advantage of the previously built fence then he becomes liable to the one who built the fence originally for one-half the value of the fence. The legislation provides that if the person who has been notified of his neighbor's intention to build the fence shall fail to give any notice of his desire to leave his land open and also shall fail to come forward within 30 days and build his half, then he can be held liable to the person who build the fence for one-half of the expense thereof. From that point forward, the fence is declared to be a division fence between the lands of the neighbors. One of the interesting exceptions included in Virginia legislation is that the owner of land not used for agricultural purposes which adjoins land used for agricultural purposes does not have the option of choosing to allow his land to lie open. Such owners have an absolute obligation to build one-half of the fence and can be held liable for expenses of building one-half if properly notified as specified above.

A slightly different situation may exist where a division fence has already been built and used by adjoining landowners. If such a fence gets out of repair to the extent that it is no longer a lawful fence, then either of the adjoining landowners may give written notice to the other of his desire and intention to repair the fence and thus require him to come forward and repair his half. Again, should he fail to come forward within 30 days after being notified, the one wishing to repair the fence can do so and hold the other owner liable for one-half of the expenses of repair.

Even though these statutory provisions are available to force owners to assume their responsibilities, the better procedure is for the two landowners to agree with respect to the construction and maintenance of the fence between their lands. Any such agreement should be in writing. An attorney can draft such an

agreement which not only will bind the owners, but also future owners of the two properties if properly filed. The law specifically allows such agreements to be binding if they are in writing and if they are recorded in the deed book in the clerk's office in the county in which the land is located. Often, it is to the advantage of the neighbors to establish such an agreement at a time when a good relationship exists between them. This protects both in case one should sell the property and should the new owners not be cooperative.

Lawful Fences in Virginia

Virginia legislation defines certain types of fencing which are considered lawful fences. This is particularly important in the counties where the general fence law is in effect. In those counties, the owner of animals is responsible for damages they do if they cross a lawful fence. This definition is also important in determining the rights of landowners as to division fences.

Although the law specified certain types of fencing that will quality as lawful fences, the intent is to provide for fences such that livestock are not able to creep through. The following are defined specifically as lawful fences by Virginia Statute Sec. 55-299:

1. Five feet high, including if the fence be on a mound, the mound to the bottom of the ditch.

2. Of barbed wire forty-two inches high consisting of eight strands of barbed wire, firmly fixed to posts substantially set in the ground at intervals of sixteen feet, with a substantial stay or brace half way between such posts, to which such wire shall be also fixed, when such wires are placed as follows. The first wire, two and one-half inches above the ground; the second, five and one-half inches; the third, nine inches; the fourth, thirteen and one-half inches; the fifth, nineteen inches; the sixth, twenty-six and one-half inches; the seventh, thirty-four and one-half inches; and the eighth, forty-two inches.

3. Of boards, four feet high, consisting of five boards not less than five inches wide, and firmly attached to posts placed at intervals of eight feet, or

4. Three feet high within the limits of the incorporated town whose charter does not prescribe nor give to the council thereof power of prescribing, what shall constitute a lawful fence within such corporate sufficient to turn all kinds of livestock shall also be deemed a lawful fence as to the livestock mentioned.

The law further provides that any wire fence of any kind whatsoever, except as above described, shall be forty-four inches high and of such construction that the stock cannot creep through the fence. It should be clear that the law intends to detail certain types of fences which are definitely considered to be lawful, but at the same time allow other types of construction so long as they are sufficient to prevent animals from crossing. Because of this, the determination of whether or not a particular fence is "lawful" will depend upon circumstances and facts in the case, i.e., does it keep the animals in. And as described earlier, a lawful fence can be the boundary if so designated by the board of supervisors.

Cattle Guard

A cattle guard may be considered to be a lawful fence if it is reasonably sufficient to turn livestock including horses, mules, cattle, hogs, sheep or goats. Other provisions within the fencing law of Virginia also establish certain rights with regard to cattle guards. For example, an owner of property on which there is a road or right-of-way which is not a public road but a private easement has the right to place cattle guards or gates across the right-of-way when required for the protection of livestock. The person who has the easement or right-of-way across the property may, at his own expense replace any gate with a substantial cattle guard which is sufficient to turn livestock.

The cattle guard must then be maintained and kept in good repair by the holder of the easement right. This same legislation provides that if the gate to be replaced is used for the passage of animals then the person who is replacing the gate with the cattle guard must provide for the passage of animals in some way. For example, the cattle guard could be placed adjacent to a gate to allow passage of animals.

Many landowners place cables across boundaries or entrances to their fields, woodlots or lanes. These cables have resulted in deaths to snowmobile drivers, motorcycle riders and others due to accidents. Such cables are often not visible by an individual from the distance. In this author's opinion, such cables are examples of negligence if not callous because of the danger they represent. A well-constructed gate should be used to replace these items at the boundary or exterior of landowners' property.

This information was taken from the following sources:

"Your Obligations and Rights Under Fencing Laws of Virginia" in Virginia Agricultural Economics (No. 332) April 1982, L. Leon Geyer, VPI & SU, Department of Agriculture Economics

"Your Obligations and Rights Under Fencing Laws of Virginia" A paper revised March 5, 1987. L. Leon Geyer and Kevin McLaughlin, VPI & SU, Department of Agriculture Economics

Virginia Statues 55-298 through 55-322

ECONOMICS OF THE BEEF SECTOR: CURRENT SITUATION AND A PERSPECTIVE FOR THE 1990S

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Introduction

Producers will make important decisions during 1989. It is important that those decisions be made on a base of understanding of what has occurred in the industry in recent years and what will be happening in the industry as we head toward the 1990s. My objective here is to develop the outlook for price and related marketing strategies in the context of industry-wide trends.

Historical Developments

Table 1 records January 1 inventory numbers since the 1950s. The herd peaked in 1975 at 132 million head and is now down to less than 99 million. With average herd size below 50 head, the liquidation of over 33 million head is the equivalent of over 660,000 producers.

The primary force behind the liquidation is the dramatic decrease in demand for beef that became most observable after 1979. Table 2 records per capita consumption of beef, nominal (observable) retail prices, and deflated (inflation adjusted) prices across recent years.

From 1979 through 1987, the nominal prices were "locked" in a $2.30 to $2.50 price range. Any attempt to raise prices at retail were rebuffed by consumers whose preference patterns were changing and who were finding alternative products.

Across that same time period, the farm-to-retail price spreads increased by over 25 percent. Since consumers would not accept price increases, the expanding middlemen's margins pushed live cattle prices lower. In the face of price pressure and rising costs, herd liquidation resumed in the early 1980s and still has not run its course.

The price-quantity data for 1987 suggest the situation is starting to stabilize. From 1986 to 1987, there was no dramatic drop in price, but that was due primarily to a decrease in quantity produced and offered for sale.

When considering demand, it is important to keep in mind that neither per capita consumption nor price taken alone is a legitimate measure of demand. Demand is price *and* quantity. To emphasize the point, Figure 1 shows the price-quantity combinations for beef for 1979 through 1987. During the 1979-86 period, per capita consumption (which is per capita *supply,* of course) was essentially constant. It would make no sense to argue that demand was stable during the period because per capita consumption was constant *when a 35 percent reduction in price was required to get the consumer to buy the same quantity.*

Looked at another way, a *given level of demand* is the entire schedule of quantities that consumers will take at the various prices. On a graph, that set of price-quantity combinations gives a sloping demand curve like the one shown in Figure 2. If you start at a point such as A, any move the next year up and to the right is an *increase* in demand. That is, being able to sell more at higher prices says, quite logically, that something good is happening on the demand side. Conversely, moves from A down or down and to the left says demand is decreasing -- and that is what we saw from 1979 through 1987.

Is the negative picture on the demand side being reversed? Figure 3 suggests the answer is "no" during the first quarter of 1988. The price-quantity point for Quarter 1 of 1988 could lie *below* a

Table 1. Cattle Inventory and the Cow Herd

Year	Total Cattle Numbers	Beef Cow Herd
	(1,000 Head)	
1960	96,236	26,344
1961	97,700	27,327
1962	100,369	28,691
1963	104,488	30,589
1964	107,903	32,794
1965	109,000	34,238
1966	108,862	34,442
1967	108,783	34,708
1968	109,371	35,565
1969	110,015	36,511
1970	112,369	36,689
1971	114,578	37,878
1972	117,862	38,810
1973	121,539	40,932
1974	127,788	43,182
1975	132,028	45,712
1976	127,980	43,901
1977	122,810	41,443
1978	116,375	38,738
1979	110,864	37,062
1980	111,242	37,107
1981	114,351	38,773
1982	115,444	39,230
1983	115,001	37,940
1984	113,700	37,494
1985	109,801	35,393
1986	105,468	33,633
1987	102,000	33,779
1988	98,994	32,958

sloping demand curve drawn through the point for Quarter 1 of 1987. So, things may be starting to consolidate, but we see no evidence of increases in demand to date.

In looking ahead on price, we have to keep what has happened on the demand side and what the situation currently appears to be. The better prices this year have been primarily supply-side in origin. The herd is down. We have a large percentage of our cattle in the feedlots, but the on-feed count this fall has now dipped below 1987 levels due to losses on cattle coming out in the summer months. It is obvious, as we look ahead, that the historical developments have generated the potential for supply-side price strength.

Current Situation

In late 1988, a summary of the forces that will influence 1989 cattle prices would include:

- The smallest cattle herd since the 1960 period;
- Cattle-on-feed numbers below 1987 levels;
- Corn prices that are likely to average well below $3.00 during 1989;

Table 2. Per Capita Consumption and Price of Choice Beef at Retail, Actual and Deflated (CPI, 1967 = 100), 1970-1987

Year	Per Capita Consumption (lbs. retail weight)	Retail Price (cents/lb.)	Deflated Retail Price (cents/lb.)
1970	84.01	101.7	87.90
71	83.38	108.1	89.04
72	85.44	118.7	93.83
73	80.54	142.1	106.28
74	85.60	146.3	100.62
75	87.89	154.8	97.48
76	94.36	148.2	88.69
77	91.76	148.4	83.89
78	87.24	181.9	95.84
79	78.05	226.3	109.91
80	76.50	237.6	105.93
81	77.13	238.7	96.72
82	77.17	242.5	92.38
83	78.61	238.1	87.35
84	78.48	239.6	84.72
85	79.10	232.6	79.66
86	78.70	230.7	70.25
87	75.7	242.5	71.20

- Cash hog prices below $40, with prospects for prices in the $40s during much of 1989;
- Increasing demand for pork since early 1987, with the possibility that the improvement could spread to beef; and
- The possibility that herd-building tendencies will develop during 1989 after two years of strong calf and stocker calf prices.

Overall, the price outlook is strong but uncertain and variable. We are set up for volatile prices during 1989, especially for the lighter cattle.

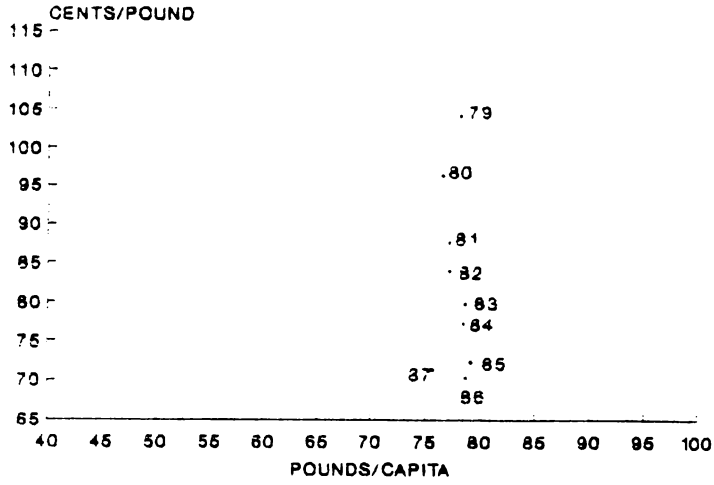
Price Patterns

Stocker and feeder cattle prices will work higher into the spring months. Light calves will be over $1.00 again, and 700-pound steers could sell in the mid $80s during the spring months, with an occasional surge to the high $80s not out of the question.

Fed cattle prices will be generally in the $70s during the year, with a dip to the high $60s possible during any periods of bunched fed marketings. There is currently lots of optimism, but the prices for fed cattle will be constrained by the moderate prices in hogs. Periodic surges to the high $70s are possible, but I doubt if those price levels can be sustained.

The biggest source of uncertainty is corn prices, especially for the lighter cattle. Any weather or government program developments that push midwestern corn prices back up toward $3.00 or higher would pressure stocker and feeder cattle prices. Given what we saw in 1988 in the corn market, there is a powerful argument for doing something about light cattle prices out into 1989 *before* any weather developments can push corn prices higher -- and stocker and feeder cattle prices down.

Figure 1.Beef Price/Quantity Combination
1979-87, CPI Deflated, Retail Weights



Strategies

Producers should consider forward pricing fed cattle on rallies into the mid $70s by the February and April live cattle futures. Given the continuing problems on the demand side, it is difficult to justify a supply-demand balance that calls for fed cattle prices significantly above the mid $70s.

Stocker calves and feeder cattle coming off winter programs should face a strong market in the spring months. On rallies to the $85 level or better by the spring feeder cattle futures, producers should consider forward pricing. I prefer the options to leave the upside possibilities open. For smaller producers, minimum price cash forward contracts now being offered in Virginia are a possibility.

Long-term investment decisions need to be made with the situation on the demand side in mind. Any herd building tendencies that develop are not likely to last the 6-8 years we used to see unless demand starts to improve. Expansion via pairs or bred females looks like a better approach than holding back the heifer calf.

Figure 2. Typical Downward Sloping
Demand Curve

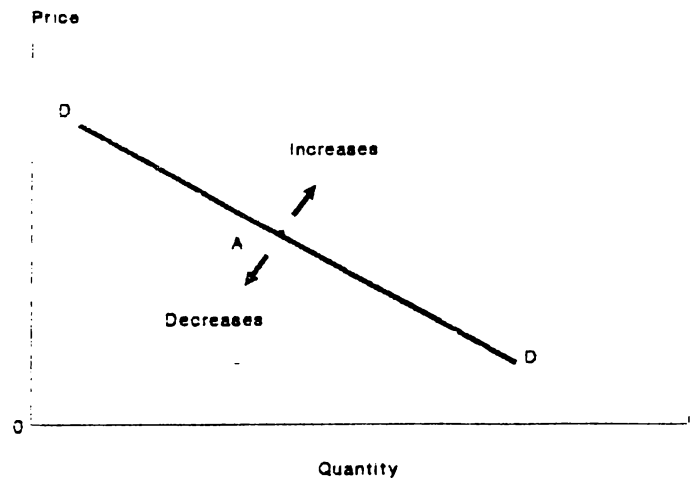


Figure 3. Beef Price/Quantity
1979-1988, Quarter 1