1989 NEBRASKA BULL SELECTION CLINICS

NEBRASKA
BULL SELECTION CLINICS

University of Nebraska

SPONSORED BY THE NEBRASKA CATTLEMEN PUREBRED COUNCIL AND THE COOPERATIVE EXTENSION SERVICE - UNIVERSITY OF NEBRASKA

Wednesday
FEBRUARY 8
Gothenburg Livestock Auction Co.
GOTHENBURG, NE.

Thursday
FEBRUARY 9
Sandhills Livestock Auction
THEDFORD, NE.

Friday
FEBRUARY 10
Loup City Commission Co.
LOUP CITY, NE

1989 NEBRASKA BULL SELECTION CLINICS

PROGRAM

Noon Lunch

12:45 Welcome and Introduction

1:00 Expected Progeny Differences (EPDs) - What They Are--What They Aren't
Dr. Jim Gibb, Director, Education and Research, American Polled Hereford Association (APHA), Kansas City, MO.

1:30 Demonstration of EPD use in Bull Selection
Dr. Jim Gibb, APHA
Dr. Jim Gosey, Extension Beef Specialist, UNL
Dick Helms, Vice-Chair, NC Purebred Council, Arapahoe

2:30 Break

2:45 Breeding Soundness Examination (BSE)
Don Hudson, D.V.M., Extension Veterinarian, Univ. of NE., North Platte
Gary Rupp, D.V.M., Director, Veterinary Program, US MARC, Clay Center

3:15 Use of Pelvic Measurements
Dr. Gene Deutscher, Extension Beef Specialist, Univ. of NE, North Platte

3:45 Wrap-up

- -

NEBRASKA CATTLEMEN - PUREBRED COUNCIL

HOSTS: Gothenburg - Bruce Treffer, Dawson County Extension Agent

Thedford - Jack Robinson, Central Sandhills County Extension Agent
Mick Glaze, Cherry County Extension Agent, Valentine

Loup City - Scott Brady, Central IV Counties Extension Agent

TABLE OF CONTENTS

page

BULL SELECTION WORKSHEETS.....1&2

USING EPDs IN SELECTING BULLS.....3

U.S. BEEF BREED ASSOCIATIONS.....11&12

SIRE SUMMARY EXAMPLES

- ANGUS.....13
- BRANGUS.....15
- GELBVIEH.....17
- HEREFORD.....19
- LIMOUSIN.....21
- POLLED HEREFORD.....23
- RED ANGUS.....25
- SALERS.....27
- SHORTHORN.....29
- SIMMENTAL/SIMBRAH.....31
- SOUTH DEVON.....33
- TARENTAISE.....35

DETERMINING BULL FERTILITY.....37

OFFICIAL BREEDING SOUNDNESS EXAM(BSE) SCORESHEET.....44

REPRODUCTIVE TRACT ANATOMY & PHYSIOLOGY OF THE BULL.....45

PELVIC MEASUREMENT FOR REDUCING CALVING DIFFICULTY.....49

MANAGEMENT OF YEARLING BULLS.....53

ANNUAL COST OF KEEPING A BULL.....56

SIRE SUMMARY REQUEST BLANK.....57

BULL SELECTION WORKSHEET

Bull I.D.	Calv. Ease/ B. wt. EPD	Wean wt. EPD	Milk EPD	Maternal EPD	Yrlg. wt. EPD	Breed Group / Comments
1.						
2.						
3.						
4.						

Scenario A	Scenario B
1st Choice _____ 2nd Choice _____	1st Choice _____ 2nd Choice _____
Reasoning _____	Reasoning _____

BULL SELECTION WORKSHEET

Bull I.D.	Calv. Ease/ B. wt. EPD	Wean wt. EPD	Milk EPD	Maternal EPD	Yrlg. wt. EPD	Breed Group / Comments
1.						
2.						
3.						
4.						

Scenario A	Scenario B
1st Choice _____ 2nd Choice _____	1st Choice _____ 2nd Choice _____
Reasoning _____	Reasoning _____

USING EPDs IN SELECTING BULLS

Edited by*
Jim Gosey
Extension Beef Specialist
University of Nebraska, Lincoln

Genetic evaluation programs used by the beef cattle industry have changed substantially in the last decade. These programs provide both purebred breeders and commercial bull buyers with a powerful tool to make directional change in beef performance traits. With this tool, commercial cow-calf producers can design a herd that satisfies their goals and production objectives. Expected Progeny Differences (EPDs) are the key to being in control of this designing process.

The use of EPDs are resulting in significant genetic change within purebred populations of cattle. It is time for the commercial industry to start capitalizing on these same genetic improvement programs. Commercial bull buyers need to understand EPDs and how to use them when buying a bull.

WHAT EPD VALUES ARE

Expected progeny differences or EPDs simply predict how future progeny of a sire will perform for various production traits.

For example, suppose bull A has an EPD of +35 pounds for weaning weight and bull B of the same breed has an EPD of +10 pounds for the same trait. If these two bulls are mated to comparable cows, the average weaning weight on calves from bull A would be expected to be 25 pounds heavier than the calves from bull B. The 25 pounds is the difference between the two EPDs (35 - 10 = 25).

Bull	EPD, lb	Average Progeny Calf Weaning Weight, lb.
A	+35	585
B	+10	560
Difference	25	25

Every EPD value published on a bull has an accompanying accuracy (ACC) value. The ACC value tells how reliable the EPD is and range between 0 and 1, least reliable to most reliable. The ACC value depends upon the amount of information available when the bull was last evaluated. Sources of information include the bull's own performance records, records on his progeny as calves and records on relatives (sire, dam, full and half-sibs). The more information available, the higher the ACC value. The following table can be used as a guide when considering bulls of similar EPD values, but differing in the ACC values.

*Adopted from a paper by Dr. Doyle E. Wilson, Livestock Systems Specialist, Iowa State University.

Range of Accuracy Values	Meaning	Potential of EPD to Change
.10 - .30	Low reliability, little information available	High
.40 - .70	Moderate reliability evaluated on 10-20 progeny	Moderate
.70 - .99	High reliability bull evaluated on more than 20 progeny	Low

The following table of ACC values gives typical ranges in EPD changes that could occur for Simmental bulls. Approximately 67 percent of all EPD changes will fall within + or - the possible change value (one standard deviation) for a given ACC. For example, if a Simmental bull has a yearling weight EPD of +20.3 lb. with an ACC of .60, then there is a 67 percent chance that his next EPD value will not be less than +10.0 lb. (20.3 - 10.3) nor greater than +30.6 lb. (20.3 + 10.3).

STANDARD ERRORS OF PREDICTION FOR VARIOUS LEVELS OF ACCURACY

ACC	First Calf Calving Ease	Birth Weight	Weaning Weight	Yearling Weight	Maternal First Calf Calving Ease	Maternal Weaning Weight	Maternal Milk
0.00	5.5	3.0	16.3	25.9	5.6	12.1	11.9
0.10	5.0	2.7	14.7	23.3	5.1	10.9	10.7
0.20	4.4	2.4	13.0	20.7	4.5	9.6	9.5
0.30	3.9	2.1	11.4	18.1	3.9	8.4	8.3
0.40	3.3	1.8	9.8	15.5	3.4	7.2	7.1
0.50	2.8	1.5	8.1	12.9	2.8	6.0	5.9
0.60	2.2	1.2	6.5	10.3	2.3	4.8	4.7
0.70	1.7	0.9	4.9	7.8	1.7	3.6	3.6
0.80	1.1	0.6	3.3	5.2	1.1	2.4	2.4
0.90	0.6	0.3	1.6	2.6	0.6	1.2	1.2
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0

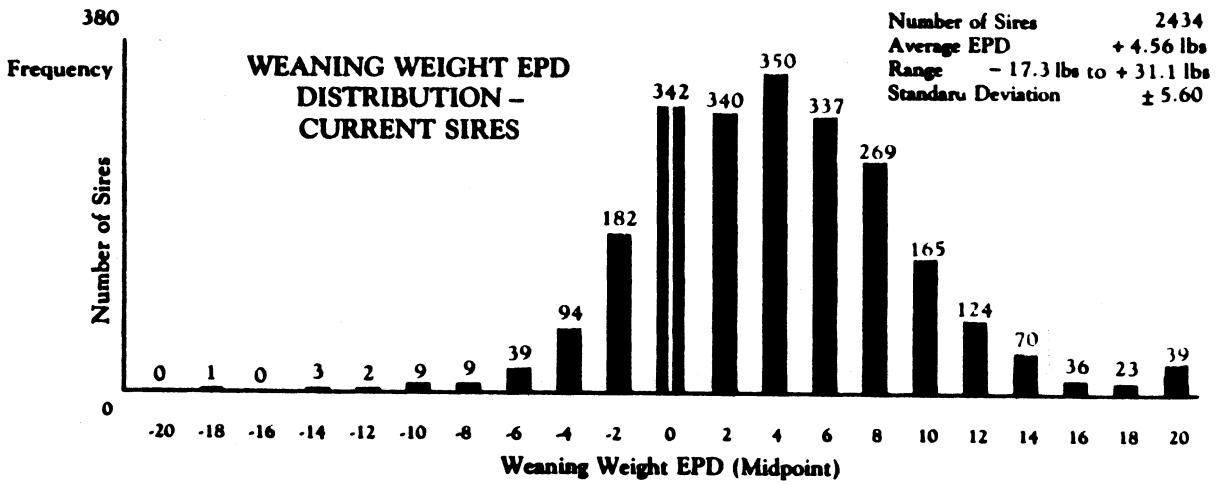
Source - 1989 Simmental Sire Summary

EPD values are the result of computerized genetic evaluation programs that analyze calf performance records as a part the breed's herd improvement program. Performance records include birth weights, 205-day adjusted weaning weights, 365-day adjusted yearling weights, calving ease scores, frame size, scrotal circumference, and various carcass traits. The genetic evaluation programs account for trait heritabilities, environmental and management differences among herds, the number of records available for evaluation, and the pedigree relationships among all of the animals being evaluated. The EPD values are obtained simultaneously for all animals within a breed, including EPD values for animals no longer living. The EPD values are then published by the various breed associations for bulls that are currently being used and meet a minimum level of ACC. Many of the breeds are also putting the EPDs on microcomputer floppy disks so that the lists can be quickly scanned to find the bulls meeting certain standards.

EPD values are relatively new tools available to breeders. The first sire summaries that were truly national in scope came out in 1980, and were made possible by the incorporation of field records in the evaluation model. EPD values replace and go beyond estimated breeding values (EBV) and contemporary

group ratios that have been used for several years by breeders. While EBV values and contemporary group ratios have and continue to be useful to purebred breeders for within-herd selection decisions, their value to commercial bull buyers is somewhat limited. The biggest problem with EBVs and contemporary group ratios is that a ratio of 105 for weaning weight for a bull from one herd cannot be compared to a ratio of 105 for another bull from a different herd. Purebred herd genetic differences can be significant, and the differences can be covered up by the different environments and management. As a commercial bull buyer, only compare ratios on bulls that come from the same herd and have been reared in the same management group. Do not use ratios of bulls to ascertain the level of genetic merit between purebred herds.

EPD values on bulls within a breed follow a normal distribution. The majority of bulls will cluster around an average EPD value. Then there are the few that are extreme for a given trait. A typical distribution of EPD values is given in the following figure. This distribution is for current sires appearing in the Limousin 1988 Sire Summary. Equally, if not more important, would be a distribution of EPD values for the birth year group from which you are making your bull selection.



Source - North American Limousin Foundation 1988 Sire Summary.

WHAT EPD VALUES ARE NOT

EPD values can be used effectively, and they can be misused and be totally ineffective. It is very important for commercial bull buyers to understand the limitations of EPDs so that they are not misused.

EPD values are not an absolute guarantee of how calves from a particular bull are going to perform. First, it must be noted that most beef performance traits are about 20 to 30 percent heritable. This means that 70 to 80 percent of all the variation seen in calf performance is environmental in origin. A big component of performance can be due to disease, weather, parasites, 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 parents, such as embryo transfer (ET) calves.

EPD are not static. EPD for any given bull will change. In fact, every registered bull that is currently being evaluated will get a new set of EPDs annually, or as often as the breed association runs another genetic evaluation. Recall that EPDs are expectations of how the calves sired by a particular bull

will perform. As more information is collected on which to evaluate this bull, its EPD values will probably change. In the absence of genetic trend within a breed, bulls having EPD with high ACC values will change very little, bulls having EPD with low ACC values could change considerably. In the presence of positive genetic trend even the EPD values with high ACC will decrease from one evaluation to the next. Some important points to remember are:

1. When comparing two bulls, concentrate on their EPD difference. Only the difference is relevant, not the absolute values themselves.

2. Many of the bulls bought by commercial cow-calf producers are yearling bulls, so these bulls automatically fall into the category of low ACC bulls. The herd that is large enough to use a group of bulls has an advantage over a small herd in minimizing the risk of using an unproven bull.

3. The EPD of a yearling bull born in 1986 cannot be fairly compared to the EPD of a yearling bull born in 1988, unless the older bull's EPD is updated and the genetic trend accounted for.

EPD values are not directly comparable across breeds. This is a source of frustration to commercial bull buyers. A Simmental bull with an EPD of +25 pounds for weaning weight is not directly comparable to a Hereford bull with the same EPD value, even if the ACC values are the same. One Simmental EPD value can only be compared to another Simmental EPD; one Hereford EPD value can only be compared to another Hereford EPD. Previous use of bulls with known EPDs from both of these breeds in your herd and results of breed evaluation studies in research stations are ways that you have of assessing how new bulls of different breeds may compare in terms of progeny performance.

EPDs are not available on all bulls. The only bulls that have EPDs are those that have been involved in a breed performance program. However, even some purebred herds that participate in their breed's program will not have EPDs for yearling bulls. There are three main reasons for this: 1) the bull did not have his own individual performance record included in the most recent across-herd genetic evaluation, or 2) the breed association computes EPDs only for bulls with progeny performance records, or 3) the bull was an embryo transfer calf. If EPDs are not available for a young bull, then the commercial bull buyer will need to put together a pedigree estimated EPD.

PEDIGREE ESTIMATED EPDs

A few breed associations have implemented "interim EPD" programs to compute EPDs for young bulls and heifers that have not had the opportunity to have their own performance record included in the most recent evaluation. However, there are still going to be many cases where the EPDs are not available for review at sale time.

The procedure to put together a "Pedigree Estimated EPD" for a young bull is straight forward as long as two conditions are satisfied: 1) you understand how breeding value is transferred from one generation to the next, and 2) you have access to EPDs on animals in the young bull's pedigree.

TRANSFER OF BREEDING VALUE

The calf receives a sample half of the sire's genes and a sample half of the dam's genes. Similarly, the sire had received a sample half of the genes from its sire and dam (the young bull's paternal grandsire and granddam).

ACCESS TO PEDIGREE EPDs

Some breeders holding production bull sales provide a performance pedigree along with the individual bull performance data. The pedigree typically includes EPDs of the sire and maternal grandsire (MGS). If the pedigree EPDs are not listed in the sale catalog, then your only alternative to constructing the Pedigree Estimated EPDs is to go through the breed's sire summary and hope the bulls in the pedigree appear in the summary.

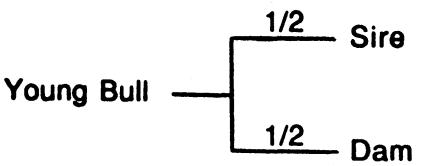
With a calculator, or paper and pencil, you can construct a Pedigree Estimated EPD using the following rule:

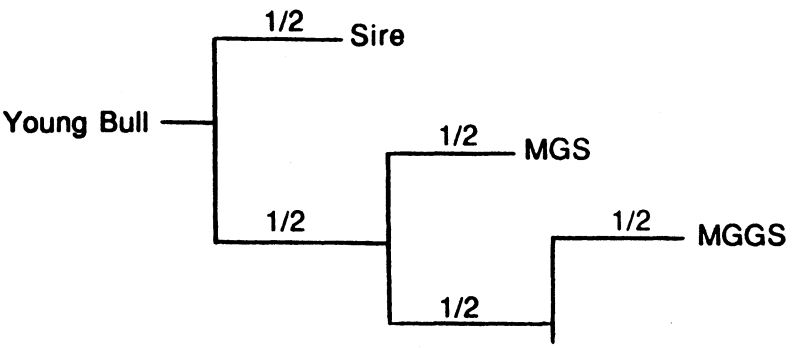
$$EPD^{\text{Young Bull}} = 1/2\ EPD^{\text{Sire}} + 1/2\ EPD^{\text{Dam}}$$

If the dam's EPD is unavailable, the Pedigree Estimated EPD can include EPDs from the dam's pedigree using the following rule:

$$EPD^{\text{Young Bull}} = 1/2\ EPD^{\text{Sire}} + 1/4\ EPD^{\text{MGS}} + 1/8\ EPD^{\text{MGGS}}$$

Note that genetic material is halved each generation in the following pedigree diagrams. In the first pedigree, both the sire and dam EPDs are known. In the second pedigree, the dam's EPDs are not known, but EPDs for both the MGS and maternal great grandsire (MGGS) are known. If the dam's EPDs are known and used in the Pedigree Estimated EPD, you cannot include the MGS or MGGS EPDs in the estimate, because their genetic contribution to the young bull is already accounted for in the dam's EPDs.





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

Relationship to the Young Bull	Pedigree EPDs lb		
	BWT*	WWT	YWT
Sire	+5.6	+23.2	+38.2
Dam	+1.2	-2.3	+2.3
MGS	+2.1	-7.3	+1.2

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

*BWT=Birth weight, WWT=Weaning, YWT=Yearling weight

CONTEMPORARY GROUP RATIOS

After you have computed the Pedigree Estimated EPDs for the bulls of interest, then look at their individual contemporary ratios. For two young bulls with similar EPDs, the ratio can be used to decide which bull is genetically superior.

HOW TO USE EPD VALUES

As a commercial bull buyer, you need to think "performance specification" when looking at buying a replacement bull. You also need to think in terms of four categories of specification as they relate to your breeding and production objectives:

1. Reproduction as affected by calving ease or birth weight, fertility and mature cow size,

2. Growth to weaning and postweaning gain,

3. Maternal or milking ability in replacement females, and

4. Carcass merit.

All of the breed genetic evaluation programs are geared to provide specifications for the first three categories. The manner in which this is accomplished may differ. For example, the American Simmental Association provides calving ease information on bulls, whereas, the American Angus Association provides EPD for birth weight. Both systems are aimed at helping breeders minimize calving difficulties, particularly in first-calf heifers. There is currently little capability to select bulls based upon EPDs for carcass merit. The American Angus Association has a few bulls evaluated for carcass merit as does the American Simmental Association. Many of the breeds will probably be expanding their emphasis on carcass merit within the next few years because of packer interest in carcass "specs" and because of changing consumer preferences.

The task in selecting bulls based upon EPD values would be fairly straight forward if you only had to be concerned with one objective. However, this is seldom the case. You may be interested in calving ease, but do not want to sacrifice weaning weight performance. Or you may want to increase milking level in the cow herd and keep mature size where it currently is. Not every bull will satisfy all of your criteria and some tradeoffs will probably have to be made.

An example of the tradeoffs made by two different commercial cow-calf producers (A and B) when searching for their next bull are summarized in the following three tables. The tradeoffs and final bull choices were 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.

	EPDs, 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	Bull 2 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.

EIGHT STEPS IN PREPARING TO USE EPDs

Even though the definition of an EPD is straight forward, there is some homework required to effectively use them. The following eight steps may be helpful in this regard.

1. Obtain a copy of the most current sire summary from the breed or breeds of interest to you. Then familiarize yourself with the reporting format and the traits the bulls are evaluated on.

2. Determine what your selection goals are before going to the production sale or to a breeder's place to look at new bulls.

3. Have some idea of the trait tradeoffs that you may have to make.

4. Determine what the acceptable range of EPDs are for your herd.

5. Determine what the average EPD is for the age category of bulls you are considering buying. You will often hear that the average EPD value is zero, however, most of the bulls with EPDs equal to zero are dead. It is important that you know what the breed's EPD reference points are.

6. Challenge yourself to be more knowledgeable on the subject of EPDs than the bull seller.

7. Be able to compute a pedigree estimated EPD for a young bull. Many commercial bull buyers will only be considering young bulls that do not have published or available EPDs.

8. Keep track of bull performance in your herd. Know what a bull with an EPD of +35 pounds for weaning weight actually did to the performance average of your calves. The track record will make buying the next specification bull a lot easier.

Opportunities for genetic improvements that translate into increase profits are now available to all commercial cow-calf producers.

Remember that the bull selection decision is, without question, the most critical and far-reaching decision made in a cow-calf operation. EPDs take much of the uncertainty out of this decision and allow you to know how the next crop of calves should perform, even before they hit the ground.

NATIONAL BEEF BREEDERS ASSOCIATIONS

AMERIFAX
Amerifax Cattle Ass'n.
P.O. Box 149
Hastings, NE 68901
(402) 463-5289

***ANGUS**
American Angus Ass'n.
3201 Frederick Blvd.
St. Joseph, MO 64501
(816) 233-3101

ANKINA
Ankina Breeders, Inc.
5803 Oakes Road
Clayton, OH 45315
(513) 837-4128

BEEFMASTER
Beefmaster Breeders
Universal
6800 Park Ten Blvd.
Suite 290 West
San Antonio, TX 78213
(512) 732-3132

BELGIAN BLUE
Belgian Blue Ass'n of America
5299 W. Lantana Road
Lake Worth, FL 33463

BRAHMAN
American Brahman
Breeders Ass'n.
1313 LaConcha Lane
Houston, TX 77054
(713) 795-4444

***BRANGUS**
International Brangus
Breeders Ass'n.
P.O. Box 696020
San Antonio, TX 78269-6020
(512) 696-8231

RED BRANGUS
American Red Brangus Ass'n.
P.O. Box 1326
Austin, TX 78767
(512) 451-0469

BRAUNVIEH
Braunvieh Ass'n. of America
P.O. Box 6396
Lincoln, NE 68506

***CHAROLAIS**
American International
Charolais Ass'n.
P.O. Box 20247
11700 NW Plaza Circle
Kansas City, MO 64195
(816) 464-5977

CHIANINA
American Chianina Ass'n.
P.O. Box 890
Platte City, MO 64079
(816) 431-2808

GALLOWAY
American Galloway Breeders
Ass'n.
Route 1, Box 106A
Athol, ID 83801
(208) 772-5584

***GELBVIEH**
American Gelbvieh Ass'n.
5001 National Western Drive
Denver, CO 80216
(303) 296-9257

***HEREFORD**
American Hereford Ass'n.
1501 Wyandotte
P.O. Box 4059
Kansas City, MO 64101
(816) 842-3757

***LIMOUSIN**
North American Limousin
Foundation
Room 100
Livestock Exchange Bldg.
Denver, CO 80216
(303) 296-8835

MAINE-ANJOU
American Maine-Anjou Ass'n.
567 Livestock Exchange Bldg.
Kansas City, MO 64102
(816) 474-9555

MURRAY GREY
American Murray Grey Ass'n.
P.O. Box 30085
1222 No. 27th, Suite 208
Billings, MT 59101
(406) 248-1266

MARCHIGIANIA
American International
Marchiagiania Society
(Marky Cattle Ass'n.)
Box 198
Walton, KS 67151
(316) 837-3303

NORMANDE
American Normande Ass'n.
P.O. Box 350
Kearney, MO 64060
(816) 635-5722

***Publish Sire Summaries**

PIEDMONTESE
Piedmontese Ass'n. of the United States
P.O. Box 6085
Laramie, WY 82070
(307) 742-6552

PINZGAUER
American Pinzgauer Ass'n.
R.R. 1, Box 104E
Kelly, IA 50134
(517) 597-3010

***POLLED HEREFORD**
American Polled Hereford Ass'n.
4700 East 63rd Street
Kansas City, MO 64130
(816) 333-7731

***RED ANGUS**
Red Angus Ass'n of America
4201 I 35 North
Denton, TX 76201
(817) 387-3502

RED POLL
American Red Poll Ass'n.
P.O. Box 35519
Louisville, KY 40232
(506) 635-6540

***SALERS**
American Salers Ass'n.
5600 S. Quebec, Suite 220A
Engelwood, CO 80111
(303) 770-9292

SANTA GERTRUDIS
Santa Gertrudis Breeders International
P.O. Box 1257
Kingsville, TX 78364
(512) 592-9357

SCOTCH HIGHLAND
American Scotch Highland Breeders Ass'n.
P.O. Box 81
Remer, MN 56672
(218) 566-1321

SHORTHORN
American Shorthorn Ass'n.
8288 Hascall Street
Omaha, NE 68124

***SIMBRAH & SIMMENTAL**
American Simmental Ass'n.
1 Simmental Way
Bozeman, MT 59715
(406) 587-4531

***SOUTH DEVON**
North American South Devon Ass'n.
P.O. Box 68
Lynnville, IA 50153
(515) 527-2437

***TARENTAISE**
American Tarentaise Ass'n.
P.O. Box 446
Reed Point, MT 59069
(406) 326-2100

TEXAS LONGHORN
Texas Longhorn Breeders Ass'n. of America
2315 N. Main Street
Suite 402
Fort Worth, TX 76106
(817) 625-6241

WHITE PARK
White Park Cattle Ass'n. of America
419 N. Water Street
Madrid, IA 50156
(515) 879-2128

A.I. STUDS WITH BEEF SIRE DIRECTORIES

American Breeders SErvice
P.O. Box 459
DeForest, WI 53532
(608) 846-3721

21st Century Genetics
100 MBC Drive
Shawano, WI 54166
(715) 526-2141

Select Sires, Inc.
11740 U.S. 42
Plain City, OH 43064
(614) 873-4683

Tri State Breeders
E. 10890 Penny Lane
Baraboo, WI 53913
(608) 356-8357

***Publish Sire Summaries**

A A R KNIGHT RIDER 924 10577974
Birth Date: 2-13-84 **Sire:** A A R MAVERICK 2240
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): SITZ ANGUS FARM, HARRISON, MT

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+.0	.74	+5.2	.70	-4.9	.15		-2.2	+39.7	.59

A A R MAVERICK 2130 #9825047
Birth Date: 2-15-80 **Sire:** SCHEARBROOK EMULOUS 20X9
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): MYRLE & DELIGHT GOLLAHER, CASCADE, MT

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+4.2	.78	+19.0	.76	+1.0	.61	25	+10.6	+39.8	.68

A A R MAVERICK 2240 9825048
Birth Date: 2-19-80 **Sire:** SCHEARBROOK EMULOUS 20X9
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): ARNTZEN ANGUS RANCH, HILGER, MT
STEVENSON ANGUS RANCH, HOBSON, MT

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+5.1	.93	+31.6	.93	-16.8	.82	122	-1.0	+58.2	.89

A A R NEW TREND 9958634
Birth Date: 4-5-81 **Sire:** V D A R SHOSHONE 548
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): GALEN & LORI FINK, MANHATTAN, KS
WM H & BARBARA A RISHEL, NORTH PLATTE, NE
MR & MRS ROBT J THOMAS, BAKER, OR

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+6.5	.93	+31.8	.92	+18.2	.57	18	+34.1	+56.7	.85

A A R NEW TREND 804 10577961
Birth Date: 2-28-84 **Sire:** A A R NEW TREND
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): ARNTZEN ANGUS RANCH, HILGER, MT

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.0	.71	+18.8	.67	+14.7	.15		+24.1	+34.6	.58

A A R TRAVELER 1412 10248520
Birth Date: 2-5-82 **Sire:** TRAVELER 0137 G D A R
Breeder: ARNTZEN ANGUS RANCH, HILGER, MT
Owner(s): TOM OR GLADYS WALLING, WINIFRED, MT

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+.6	.73	+3.5	.71	+6.4	.40	7	+8.2	+6.9	.61

A D D BIG BLACK B561 9669731
Birth Date: 4-4-80 **Sire:** SIR BLACK WILLIAM 1425
Breeder: A D D ANGUS FARM, ARLINGTON, IA
Owner(s): A D D ANGUS FARM, ARLINGTON, IA

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.1	.77	+6.8	.74	+4.7	.53	16	+8.1	+6.3	.70

A D D BLACK STAR 10407399
Birth Date: 4-6-83 **Sire:** CRACKER JACK BAROS 2459
Breeder: A D D ANGUS FARM, ARLINGTON, IA
Owner(s): A D D ANGUS FARM, ARLINGTON, IA

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+8.4	.74	+16.5	.70	+4.5	.25	2	+12.8	+27.4	.62

A D D PRIME CHOICE C136 10597562
Birth Date: 4-9-84 **Sire:** CRACKER JACK BAROS 2459
Breeder: A D D ANGUS FARM, ARLINGTON, IA
Owner(s): ALAN J JENSEN, NORTH ENGLISH, IA

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.4	.68	-.1	.63	+6.9	.15		+6.8	+15.3	.53

A J S GUNNER 10344639
Birth Date: 2-16-83 **Sire:** QLC WINCHESTER
Breeder: ARNOLD SIMONSEN & SON, YODER, WY
Owner(s): K & K CATTLE CO, KEARNEY, NE
T J R ANGUS, HASTINGS, NE
TAURUS BRDRS SERVICE INC, LONE GROVE, OK

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.9	.80	+31.3	.77	+3.1	.50	14	+18.8	+39.7	.62

A PLUS OF VEROLA 384 10325105
Birth Date: 4-7-83 **Sire:** MR A PLUS OF VEROLA
Breeder: VAUGHN & JUDITH DOMEIER, SUTTON, NE
Owner(s): QUIRK LAND & CATTLE CO, HASTINGS, NE

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.7	.76	+20.7	.73	-2.4	.37	6	+7.9	+10.2	.58

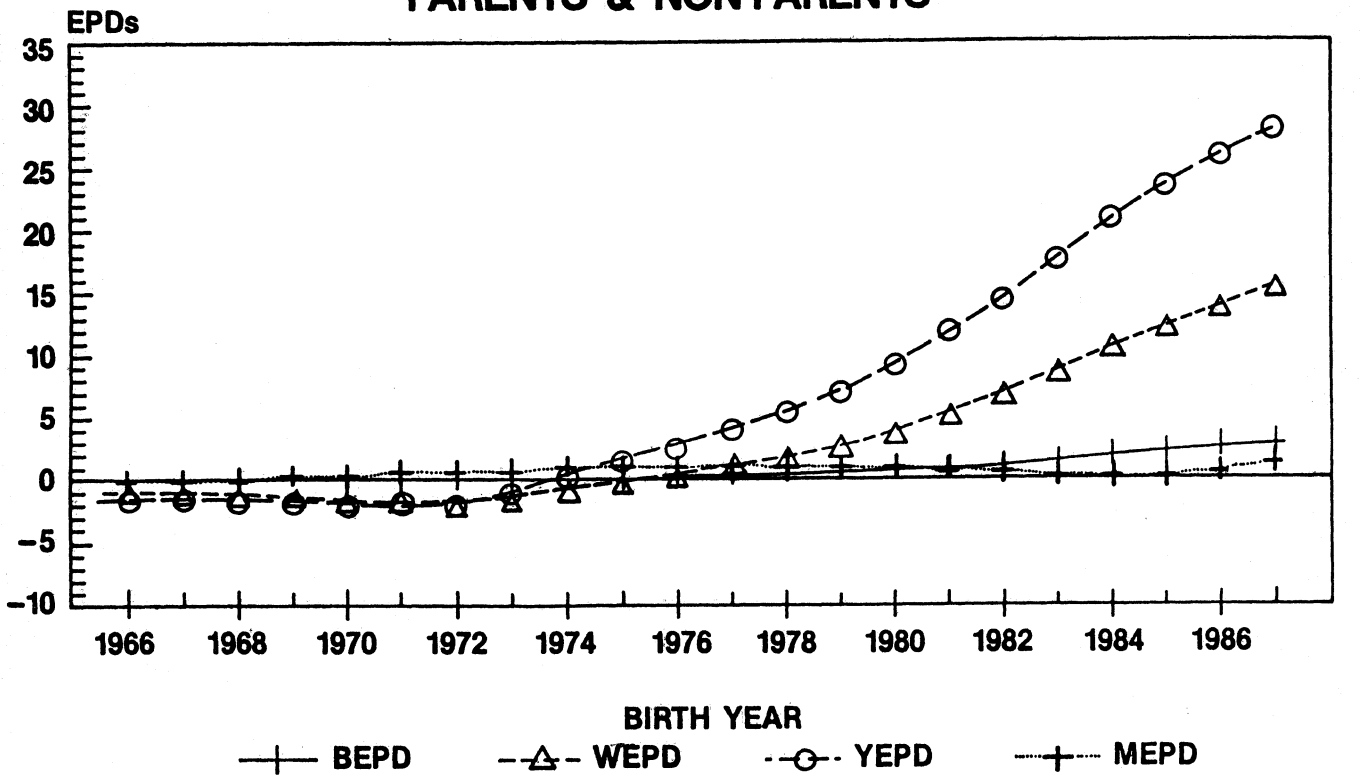
A&B POWER BOSS 140 10046430
Birth Date: 5-2-80 **Sire:** P S POWER PLAY
Breeder: ARLEN J & BECKY SAWYER, BASSETT, NE
Owner(s): SWEN BUD SEVERSON, CLARK, SD

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+3.1	.78	+15.6	.82	+1.4	.66	37	+9.2	+31.6	.74

ACES BLACKJACK 9977567
Birth Date: 4-22-81 **Sire:** SAYRE PATRIOT
Breeder: OAK VALLEY ANGUS, SHAWNEE, OK
Owner(s): TATON ANGUS FARM, ARGONIA, KS

Birth Weight		Weaning Weight Direct		Weaning Weight Milk			Weaning Weight Maternal Comb.	Yearling Weight	
EPD	ACC	EPD	ACC	EPD	ACC	DTS	VALUE	EPD	ACC
+1.3	.27	+8.1	.69	-4.4	.42	8	-.3	+15.3	.62

ANGUS
EPD TRENDS
PARENTS & NON-PARENTS



DISTRIBUTION OF EPDs - CURRENT ANGUS SIRES

	B. WT.	WEAN WT.	MILK	YEARLING WT.
AV.	+ 1.2	+ 4.8	+ 1.0	+10.6
HIGH	+13.5	+67.7	+28.4	+90.5
LOW	- 8.8	-42.7	-41.2	-40.8

DISTRIBUTION OF EPDs
NON - PARENT ANGUS BULLS AND COWS

	B. WT.	WEAN WT.	MILK	YEARLING WT.
AV.	+ 2.9	+15.0	+ .9	+26.5
HIGH	+11.0	+49.4	+22.5	+77.4
LOW	- 6.3	-19.8	-26.0	-17.9

-6 GENERAL 24/2 R252139
BD: 04/12/82 GEN: 5 SCURS: NO
S: CHOYA'S GENERAL 2559
B: CANNING RANCHES, RUIDOSO, NM
O: CANNING RANCHES, RUIDOSO, NM

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
1	4	.	.	+17.0	.58	+26.5	.42	.	.

-6 MR. SATURN 6/9 R199776
BD: 10/20/79 GEN: 3 SCURS: NO
S: BRINKS MAC TITAN 6/4
B: CANNING RANCHES, RUIDOSO, NM
O: CANNING RANCHES, RUIDOSO, NM

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
1	11	.	.	+6.8	.70	+1.9	.51	.	.

-6 MR. SATURN 600/0 R199713
BD: 02/16/80 GEN: 3 SCURS: NO
S: BRINKS MAC TITAN 6/4
B: CANNING RANCHES, RUIDOSO, NM
O: CANNING RANCHES, RUIDOSO, NM

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
4	15	.	.	+2.8	.71	.	.	.	.

-6 MR. SATURN 63/0 R199708
BD: 03/26/80 GEN: 3 SCURS: NO
S: BRINKS MAC TITAN 6/4
B: CANNING RANCHES, RUIDOSO, NM
O: CANNING RANCHES, RUIDOSO, NM

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
3	12	.	.	+2.8	.68	+3.1	.44	.	.

-6 MR. SATURN 663/0 R199760
BD: 02/16/80 GEN: 3 SCURS: NO
S: BRINKS MAC TITAN 6/4
B: CANNING RANCHES, RUIDOSO, NM
O: CANNING RANCHES, RUIDOSO, NM

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
3	12	.	.	-9.3	.65	.	.	.	.

-6 TITAN 604/1 R229720
BD: 05/20/81 GEN: 3 SCURS: NO
S: BRINKS MAC TITAN 6/4
B: CANNING RANCHES, RUIDOSO, NM
O: WRIGHTS BRANGUS, PAONIA, CO

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
1	5	+0.8	.35	+9.1	.69	.	.	.	.

-J 650- 150 R206719
BD: 02/24/80 GEN: 4 SCURS: NO
S: WSR ROCKY JOE 650
B: GRANADA BRANGUS, WHEELOCK, TX
O: JOHN T. DORRANCE 3RD, DEVILS TOWER, WY

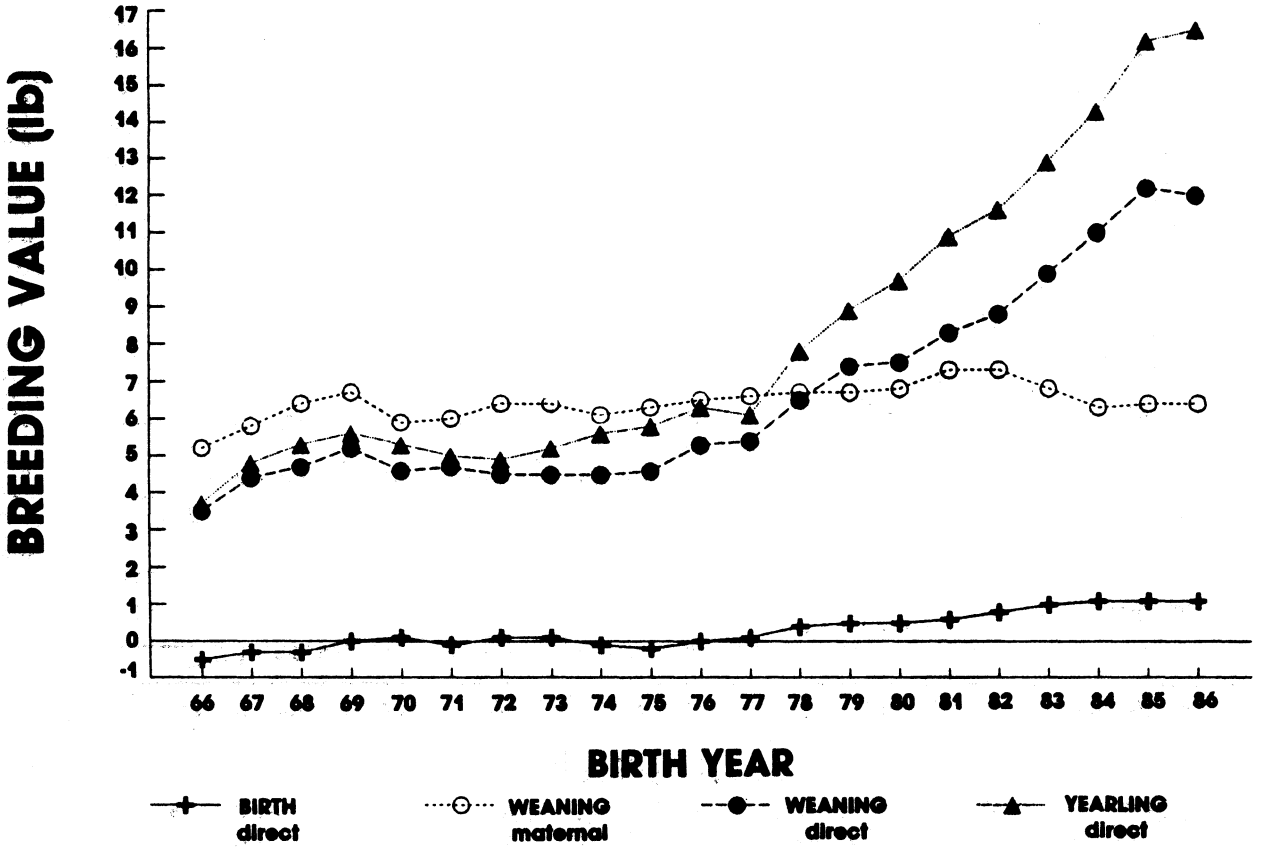
DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
1	4	+1.8	.64	+1.7	.70	.	.	.	.

/V PRINCE GEORGE25/5 R114681
BD: 05/02/75 GEN: 3 SCURS: NO
S: PW GEORGIE BOY 276/1
B: SLASH V RANCH, TUCSON, AZ
O: ROBBS BRANGUS, WILLCOX, AZ

DISTRIBUTION		BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILKING ABILITY	
HD	CG	EPD	ACC	EPD	ACC	EPD	ACC	EPD	ACC
1	15	.	.	-0.8	.82	.	.	+16.6	.62

BRANGUS GENETIC TRENDS

BIRTH, WEANING and YEARLING



1988 Brangus Sire Summary

TRAIT	NUMBER OF BULLS PUBLISHED	RANGE OF EPDs	RANGE OF ACCURACIES
Birth Weight	534	—5.9 to +8.7 lbs.	.35 to .95
Weaning Weight	681	—23.9 to +39.2 lbs.	.50 to .96
Yearling Weight	302	—28.2 to +58.1 lbs.	.35 to .92
Milking Ability	151	—17.9 to +22.6 lbs.	.50 to .93

PROGENY PROVEN SIRES

Prefix Color	Name of Bull Date of Birth	HPS	AGA Reg. Number	Sire Dam Sire of Dam	%	Current Owner & Address	No. of Herds	Birth Weight EPD ACC	Weaning Weight EPD ACC	Yearling Weight EPD ACC	Milk EPD ACC	Total Maternal EPD	Gest. Length EPD ACC	Calving Ease Direct EPD ACC	Calving Ease Daughter EPD ACC
DPR	ADMIRAL 03/02/80	H	45445	HOCHREIN MISS BAR JC 327J BELGRAD 62837	FB	PURKEYPILE/NELSON GELBVIEH RT 4 BOX 257 ELLENSBURG, WA 98926	160	5.3 .92	29.7 .91	38.3 .91	1.3 .87	16.2	-2.6 .92	82.3 .88	88.9 .87
LNR	ADMIRATION 03/28/82		61418	ADMIRAL MISS MAGNUM 488 MAGNUM	FB	HAGLUND RANCH INC. BROCKWAY, MT 59214	3	7.2 .67	25.2 .60	32.0 .60	9.3 .37	21.9	2.1 .51	80.0 .40	87.5 .38
BMB	ADOLPH N147 11/27/81	H	56059	MONARCH JLC312J 4L MONARCH JLC312J	PB	FASTENAU FARMS ROUTE 2 BOX 165 BERTRAND, NE 68927	1	2.4 .61	34.1 .60	44.4 .60	1.5 .49	18.6	-.6 .55	99.5 .53	98.1 .50
LAF	AHAB 01/18/80		3396	INN WENKE	FB	AHAB SYNDICATE 129 COLUMBIA DRIVE SASKATOON S7K 1E8 SK, CANADA	40	1.9 .82	4.7 .80	-1.9 .80	-4.0 .74	-1.6	.3 .82	92.0 .76	94.3 .74
BSR	ALBRO 05/06/83	H	112516	MR M91 MISS 101J MISSOURI SCOUT	PB	ROY W GRANGER PO BOX 1058 ALEXANDER, AL 35010	3	-3.2 .65	2.7 .62	-5.0 .62	6.9 .31	8.3	-.1 .48	108.6 .44	102.3 .30
CJM	ALLAN 28K 01/05/78		3393	HEIJAK KATHI 112F	FB	XZ RANCH STAR ROUTE STANFORD, MT 59479	8	1.3 .73	19.8 .72	29.0 .71	-.5 .63	9.3	-.5 .68	98.3 .64	97.5 .63
GVG	ALPHA 03/10/80	H	45318	ROCKY MISS 09K GOLDEN HASS I	PB	STEVE & CALVIN CARSTEN RT 1 BOX 143 AVOCA, NE 68307	7	4.3 .71	-14.6 .67	-27.9 .66	-2.3 .51	-9.6	2.4 .66	84.7 .54	90.3 .50
ECC	APOLLO 04/07/81		51034	IMEX ANTIGONE T3H GERONIMO	FB	CHARLES CLEMENT & SONS RR 1 BOX 7 HIGHMORE, SD 57345	13	2.4 .83	9.0 .80	13.8 .80	-5.3 .69	-.8	1.2 .84	100.0 .70	98.3 .68
DPR	ARMIN 01/29/83	H	64717	ADMIRAL MISS PURKEY MAGNET	PB	MIKRON RANCH ROUTE 5, BOX 152 MANHATTAN, KS 66502	4	3.0 .74	4.8 .68	3.5 .68	9.9 .44	12.3	-3.0 .55	93.4 .55	95.0 .44
MRB	BAMA 05/31/79	H	44011	WYOMING HASS HY-CROSS FAMOUS 58F VIKING	FB	REITZ & BUSS RR HUNTER, OK 74640	10	-2.1 .80	-7.2 .78	14.0 .78	-1.8 .73	-5.4	-.8 .79	102.7 .75	99.6 .72
	BARON 05/26/71	H	8	HAGEN HELGA	FB	UNITED & EASTERN BREEDERS INC R.R. 5 GUELPH, OT	194	-3.1 .92	-5.1 .92	-5.3 .92	8.4 .88	5.8	-3.1 .92	105.7 .90	101.0 .87
DDN	BAX 05/28/81		113550	IAN MISS TRIPLE 6-1J MAJOR	FB	HILL LIVESTOCK CO. RAYNESFORD, MT 59469	3	.1 .68	-5.9 .65	-8.1 .64	-8.7 .26	-11.7	-3.1 .34	112.7 .40	104.1 .26
	BAYOU 2F 09/04/74	H	3060	GERONIMO ELECTRA-35-	FB	ROAD RUNNER FARMS INC. RT 1, BOX 215 CLINTON, LA 70722	10	-.4 .79	-1.0 .78	2.6 .78	3.3 .70	2.8	-.2 .80	103.4 .70	99.9 .68
	BELFAST 70558 12/17/70	H	21	ARNO LOTTE	FB	CARNATION GENETICS PO. BOX 938 HUGHSON, CA 95326	76	.2 .84	.6 .82	9.1 .82	8.9 .75	9.3	-1.9 .84	103.3 .78	99.9 .74
	BELGRAD 62837 03/05/71		24	HUMBOLDT ANKE	FB	CARNATION GENETICS PO. BOX 938 HUGHSON, CA 95326	237	3.1 .94	17.1 .94	26.1 .94	-2.2 .93	6.3	-1.7 .94	92.4 .93	94.5 .92
LNR	BELGRAD AGAIN 04/16/78	H	40181	BELGRAD 62837 MISS NELLY MAGNUM	FB	CRUISE GELBVIEH INC. P O BOX 294 WALDEN, CO 80480	4	3.7 .74	-.5 .73	-7.4 .73	-10.6 .65	-10.9	-.3 .75	87.3 .65	91.7 .63
LNR	BELGRAD II 06/09/75	H	3134	BELGRAD 62837 MISS VRANI HANS	FB	MOHATT GELBVIEH 1625 HN HANS WAY FAIRBANKS, AK 99701	120	2.6 .93	6.8 .92	3.0 .92	-2.3 .90	1.1	-1.1 .93	91.9 .90	94.3 .90
LNR	BELL BOY 06/26/76	H	30533	BELGRAD 62837 CIRCLE BECKY CIRCLE IMEX	FB	MERLIN & JEANETTE PEETS RT 2 BOX 2652 ORLAND, CA 95963	4	-1.0 .73	-15.5 .69	-40.7 .69	-3.8 .60	-11.6	1.8 .74	97.9 .60	97.3 .58
IOK	BELL RINGER N31 03/19/81	H	52188	BELGRAD II MISS GOLDIE 126 VALHALLA GOLD NUGGET	PB	CIRCLE 23 RANCH 16500 COUNTY ROAD 328 BUENA VISTA, CO 81211	2	3.6 .77	9.0 .75	16.1 .75	13.3 .65	17.8	-1.0 .66	85.0 .67	90.5 .65
ECC	BERLIN 04/05/81		51033	IMEX MISS SUN 290H MAJOR	FB	HAPPY DAZE RANCH STAR ROUTE CRESCENT VALLEY, NV 89821	2	-3.1 .71	-10.0 .62	-13.7 .62	-1.2 .48	-6.2	.0 .56	126.3 .59	109.5 .48

RANGE OF EPD'S

EPD values for Gelbvieh bulls follow a normal distribution with the majority of the bulls falling into the average area of the range. Below are the EPD ranges and average EPD values for each trait.

BIRTH WEIGHT		WEANING WEIGHT		YEARLING WEIGHT		MILK	
HI	-9.56	HI	+56.19	HI	+81.23	HI	+17.39
AVG	+.329	AVG	+3.56	AVG	+4.78	AVG	+1.43
LO	+15.20	LO	-43.99	LO	-49.19	LO	-22.31

TOT MATERNAL		GEST. LENGTH		C.E. DIRECT		C.E. DAUGHTERS	
HI	+38.08	HI	+8.3	HI	151	HI	118
AVG	+3.23	AVG	-.04	AVG	99	AVG	97
LO	-32.48	LO	-4.3	LO	69	LO	80

ABC STAR MARK ET 3/01/83 18459747
S: STAR MARK DONALD ET
B: ADAMS BROS & CO KILGORE NEB
O: ADAMS BROS & CO KILGORE NEB

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	A
3	47	+4.3	.68	+33.8	.63	+36.5	.46			0	+7.9	+24.9	.1

ABC STAR MARK 3127 3/19/83 18459695
S: STAR MARK DONALD ET
B: ADAMS BROS & CO KILGORE NEB
O: CLARENCE MELBER MANOR TEX

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
2	20	+4.2	.33	+36.8	.50	+53.1	.27	+0.26	.06	0	+4.7	+23.1	.15

ABC STAR MARK DON ET 3/02/83 18459749
S: STAR MARK DONALD ET
B: ADAMS BROS & CO KILGORE NEB
O: ADAMS BROS & CO KILGORE NEB

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
2	26	+2.3	.59	+44.7	.55	+40.7	.46			0	+7.9	+30.3	.15

ACE NORTHERN 2147 3/12/82 18301413
S: BB NORTHERN B586
B: ACE HEREFORDS MINDEN NEV
O: ACE HEREFORDS MINDEN NEV

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	27			+9.6	.56	+14.5	.40	+0.36	.48	0	+3.1	+7.9	.15

ACE QUANTOCK 288 2/13/82 18301447
S: QUANTOCK D 235L
B: ACE HEREFORDS MINDEN NEV
O: ACE HEREFORDS MINDEN NEV
SCF RANCH PEBBLE BEACH CAL

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
2	30	+0.5	.47	+9.7	.57	+17.6	.40	-0.10	.51	2	+3.1	+7.9	.25

ACE QUANTOCK 3225 8/28/83 18543513
S: QUANTOCK D 235L
B: ACE HEREFORDS MINDEN NEV
O: ACE HEREFORDS MINDEN NEV

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	13			+25.9	.47					0	+3.3	+16.3	.15

ADV L1 DAVID 3016 3/03/83 18446458
S: LE GRAND DOMINO 7184
B: INDIAN MOUND RANCH CANADIAN TEX
O: B W & GARY HENNEKE BROOKSHIRE TEX

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	15	+2.3	.49	+31.3	.45	+58.7	.28	+0.35	.32	0	+13.9	+29.6	.15

ADV L1 DOMINO 3111 9/13/83 18519755
S: L1 DOMINO 75901
B: INDIAN MOUND RANCH CANADIAN TEX
O: OAK KNOLL HEREFORDS SANTA ROSA CAL

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	13			+14.0	.45	+33.0	.29			0	+6.8	+13.8	.15

ADV L1 LERCH 3006 2/01/83 18446449
S: BLR C L1 DOMINO 5109
B: INDIAN MOUND RANCH CANADIAN TEX
O: J D RUTLEDGE KERRVILLE TEX
MARGARET ANN RUTLEDGE FREDERICKSBERG TEX

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
2	16			+21.8	.47	+38.9	.30	+0.42	.36	0	+6 9	+17.8	.15

ADV L1 MARK 279 ET 10/18/82 18394979
S: L1 SPECIAL MARK ET
B: INDIAN MOUND RANCH CANADIAN TEX
O: XIX II AMARILLO TEX

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	10	+3.2	.43	+29.7	.39	+47.2	.25	+0.28	.28	0	+7.3	+22.2	.15

ADV L1 SUPERSTAR 139 2/08/82 18318758
S: L1 SUPERSTAR
B: K D OWEN & WAYNE HAYGOOD NEW HARMONY IND
O: BRUNING FARMS & CATTLE CO BRUNING NEB

DISTRIBUTION HERDS	PROGENY	BIRTH EPD	ACC	WEANING WT. EPD	ACC	YEARLING WT. EPD	ACC	YEARLING HT. EPD	ACC	MATERNAL DGT	MLK	TOTL	ACC
1	38	+1.0	.60	+22.3	.55	+41.8	.38	+0.51	.45	0	+3.4	+14.6	.15

DATA DESCRIPTION

This 1987 sire listing resulted from an analysis of AHA-TPR data as described in Table 1.

TABLE I. DATA DESCRIPTION OF 1987 HEREFORD EVALUATION

Trait	Number of Records	Number of Dams	Number of Sires
Birth weight	340,207	117,504	8,613
Weaning weight	1,214,632	360,329	24,528
Yearling weight	565,093	203,633	16,485
Yearling height	146,921	54,752	5,265
Milk	1,214,623	360,329	24,528
Milk + Growth	1,214,623	360,329	24,528

TABLE 2. 1987 SUMMARY OF PROGENY PROVEN SIRES EPDS

Trait	Number of Sires	Average EPD	Range in EPDs
Birth weight	537	+ 1.4 lb.	− 5.5 lb. to +10.8 lb.
Weaning weight	606	+23.0 lb.	− 8.4 lb. to +64.3 lb.
Yearling weight	606	+37.6 lb.	−14.8 lb. to +91.3 lb.
Yearling height	491	+0.33 in.	−0.31 in. to +1.70 in.
Milk	606	+ 6.1 lb.	−24.9 lb. to +32.1 lb.
Milk + Growth	606	+17.5 lb.	− 7.7 lb. to +49.0 lb.

TABLE 3. 1987 SUMMARY OF GENETIC RESOURCE SIRE EPDS

Trait	Number of Sires	Average EPD	Range in EPDs
Birth weight	942	+ 1.4 lb.	− 5.1 lb. to +11.5 lb.
Weaning weight	1278	+21.7 lb.	−16.1 lb. to +64.3 lb.
Yearling weight	986	+36.6 lb.	− 2.6 lb. to +91.3 lb.
Yearling height	572	+0.33 in.	−0.39 in. to +1.70 in.
Milk	1278	+ 6.8 lb.	−11.2 lb. to +25.5 lb.
Milk + Growth	1278	+17.6 lb.	− 6.1 lb. to +41.7 lb.

EPD SUMMARY

GENERAL SIRE LISTING

Registration #	Name, Owner	Birthdate	Sire	Birthweight EPD	Birthweight ACC	Weaning Wt. EPD	Weaning Wt. ACC	Yearling Wt. EPD	Yearling Wt. ACC	Milking Ability EPD	Milking Ability ACC
NIH-1	PRINCE POMPADOUR BOV IMPORT INC, CANADA	1/20/67	BARON	2.4	.99	-0.5	.99	2.0	.99	4.8	.99
NIH-3	DANDY BOV IMPORT INC, CANADA	2/17/68	NOEL	-1.8	.99	-7.6	.99	-6.4	.99	-0.6	.99
NIH-79252	SHIRBROUNS' HAVANA DRAVES FARMS, CARROLL IA	4/18/72	FILIN	-1.8	.98	-1.9	.96	-11.0	.93	-5.9	.91
NIH-83225	BOLD TYPE NORDIC FARMS & C K BOOTH, MIAMI OK	4/14/72	21 ETRANGE	0.0	.99	-6.5	.99	-5.8	.98	3.5	.99
NIH-105348	TOP OX SOUTHEAST CATTLE BREEDERS, MORRIS OK	4/19/73	135 FETICHE	0.4	.99	7.0	.99	6.7	.99	-6.1	.98
NIH-120151	KLONDIKE ROBERTS RANCH, LOCKHART TX	4/21/73	FILIN	0.0	.91	-2.9	.86	-6.0	.52	1.0	.66
NIH-128335	GARST LOBO GARST COMPANY, COON RAPIDS IA	5/21/73	FARCEUR	-0.7	.98	10.0	.97	12.6	.96	-11.1	.90
NIH-139417	2 HANCHON AV HAGADAL SWEETWATER PLANTATION LIMO, DEARING GA	8/22/72	911 ECLAIR	0.2	.99	8.7	.99	10.2	.99	-3.5	.99
NIH-139420	7 ECLAIR AV ARROD J & J LIMOUSIN, CHELSEA OK	12/28/73	911 ECLAIR	-0.1	.95	6.9	.84	8.7	.54	-11.1	.69
NIH-139426	2 FATOM AV HENNINGE CIRCLE U LIMOUSIN, CHARITON IA	7/14/73	134 FANTOCHE	0.1	.96	1.5	.95	-1.4	.87	-5.9	.88
NIH-166260	BURTON JAMISON O'BRIEN FARMS, PINEVILLE MO	7/28/74	FRISSON	0.2	.91	-14.8	.96	-12.5	.94	17.6	.90
NIH-172765	OKIE LUDOVIC JOANNCO, BELLA VISTA AR	7/28/75	FILOU	-0.1	.92	4.2	.80	---	---	1.1	.71
NIH-183434	FILHAN LEX STAUFFER FARMS, CHEROKEE OK	6/04/75	FILOU	-0.1	.94	1.0	.90	1.7	.78	12.0	.77
NIH-183452	WINTERSHALL JOB ROBERT C & NELLIE J BUTLER, MACON MO	9/30/74	FUNAMBULE	-1.2	.94	-3.5	.84	-3.5	.66	5.2	.68
NIH-184845	DAKOTA CHANCE 77 POMPADOUR HILLS RANCH, HIGHMORE SD	5/12/75	IMPERIAL	0.7	.99	3.6	.99	1.3	.98	-5.0	.97
NIH-194745	OKIE MIDAS BEAR CREEK LIMOUSIN RANCH, KIRBY AR	6/15/76	FANFARON	1.0	.82	17.5	.81	---	---	-1.9	.68
NIH-302797	HIBERNIAN NERO HIGHVIEW FARM, AUBURN AL	4/21/78	INTRUS	-3.2	.87	-1.4	.76	---	---	-1.3	.53
NIH-302813	KILFRUSH NORMAN BRIAR VALLEY RANCH HW SMITH, ROCKDALE TX	6/02/78	HERVIN	-1.6	.86	3.6	.75	---	---	0.1	.58
NIH-435044	TYTUS MAGNESS LAND AND CATTLE, PLATTEVILLE CO	9/03/82	MMB INVERNE	2.4	.96	6.8	.86	12.7	.67	1.0	.73
NIH-458073	KOH KAMP 815 YKCC/LML/SYM/BAIN/LOOKOUT, AMHERST SD	2/14/83	PRINCE	3.7	.91	2.5	.86	7.2	.74	---	---
NIH-458074	EARTHQUAKE 93 YKCC-CMC-LM/SYM/BAIN/LOOKOU, AMHERST SD	1/30/83	SILVAIN	1.5	.99	8.2	.98	16.6	.97	-16.0	.89
NIH-458075	METRIC 3049 YKCC/LML/SYM/BAIN/LOOKOUT, AMHERST SD	2/16/83	JEUNOT	1.8	.95	5.1	.91	8.8	.83	-4.2	.50
NIH-458076	TOHERING INFERNO 12 YKCC/LML/SYM/BAIN/LOOKOUT, AMHERST SD	1/22/83	MODULE	4.2	.94	11.1	.88	18.7	.82	---	---
NIH-458077	MIDWEST 40 YKCC/LML/SYM/BAIN/LOOKOUT, AMHERST SD	3/30/83	PARISIEN	1.6	.94	-12.5	.91	-23.8	.82	---	---
NIH-458078	SKYLAB 51 YKCC/LML/SYM/BAIN/LOOKOUT, AMHERST SD	2/26/83	MODULE	1.3	.77	8.3	.63	---	---	---	---
NIH-464004	URANIUM URANIUM PARTNERSHIP, CHATTANOOGA OK	2/16/83	RIGOLO	0.8	.91	4.3	.76	---	---	---	---
NIH-468306	URQUIJO EDGEMONT, NORTH GARDEN VA	2/17/83	RAGONDIN	1.4	.84	0.7	.59	---	---	---	---
NIH-468307	URANUS EDGEMONT, NORTH GARDEN VA	3/10/83	RAGONDIN	0.3	.90	5.5	.67	---	---	---	---
NIH-468614	GRAHAMS UNIVERSAL MAGNESS/WADDLE & STRANAHAN, NORMAN OK	8/07/83	SIROCCO	1.8	.91	13.7	.85	15.6	.59	---	---
NIH-468617	HARDEN TAMAR MAGNESS LAND AND CATTLE, PLATTEVILLE CO	10/01/82	FAVORI	1.4	.89	11.4	.80	14.1	.65	---	---
NIH-481384	RENEGADE HORIZON LIMO & SPITZ, MIDWAY TX	4/08/83	TANHILL PREMIER	1.8	.95	16.0	.90	19.1	.83	---	---
NIH-486083	SIROCCO MAGNESS LAND AND CATTLE, PLATTEVILLE CO	2/21/81	ODEON	2.1	.89	16.0	.69	---	---	---	---
NIH-504417	GRAHAMS VAGABOND WADDLE/MCKOWN/LAKES L ARROW, FT COLLINS CO	5/01/84	SIROCCO	1.8	.70	7.7	.50	---	---	---	---

Table 1

1989 EPD Statistics for Current Sires*

EPD	Number of Sires	Average	Standard Deviation	Range
Birth Weight	4191	+ .39	±1.15	- 6.2 to 5.5
Weaning Weight	2678	+ 1.37	±5.52	-28.7 to 26.6
Yearling Weight	2678	+ 2.84	±8.57	-38.9 to 41.6
Milking Ability	2678	+ .30	±3.88	- 20.3 to 19.9

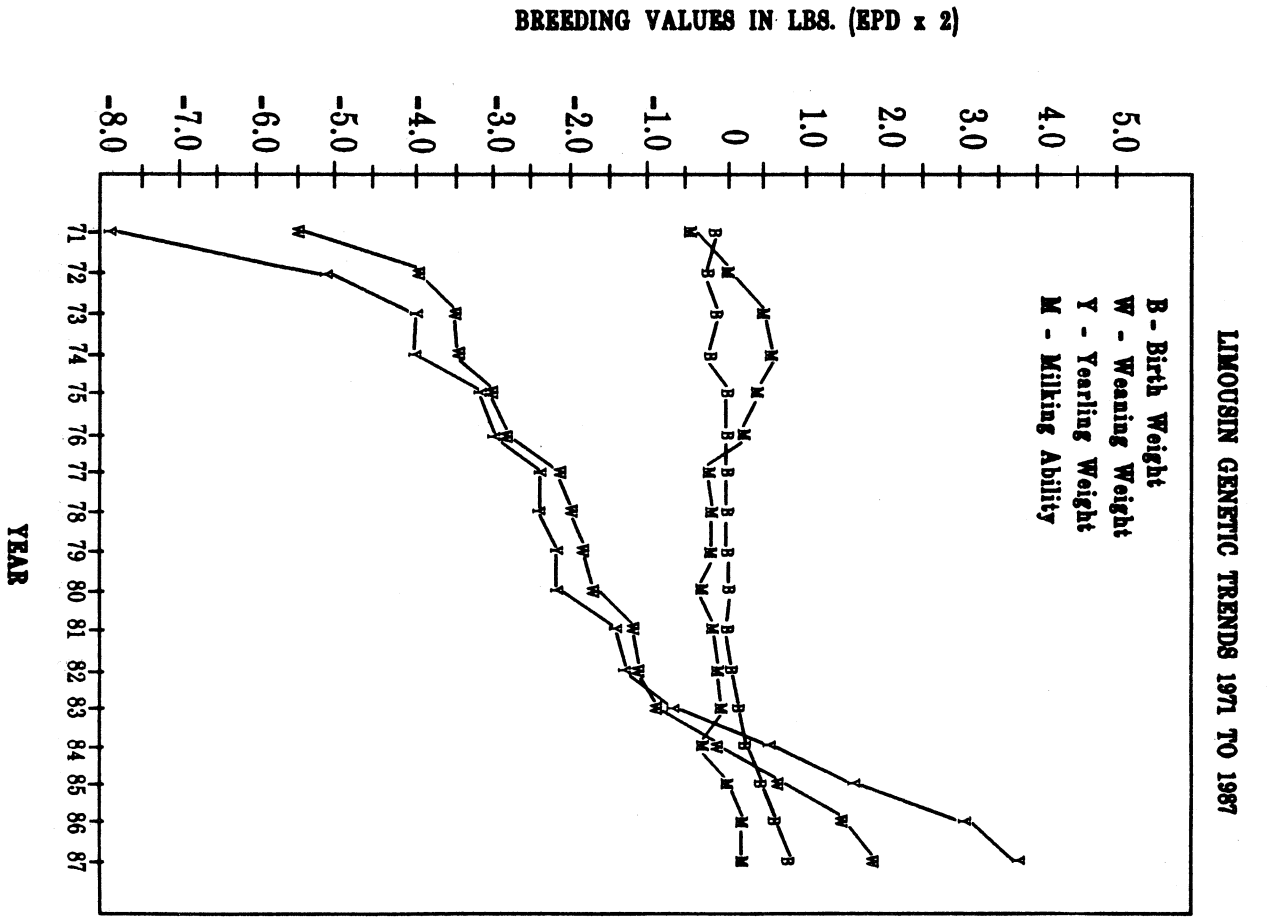
*Current sires are registered bulls that have produced one "V" or "W" progeny.

Table 2

1989 EPD Statistics for Current Dams*

EPD	Number of Dams	Average	Standard Deviation	Range
Birth Weight	35327	+.16	± .94	- 6.2 to 4.6
Weaning Weight	25954	-.17	±4.10	-19.6 to 20.8
Yearling Weight	25954	+.28	±6.36	-25.3 to 35.6
Milking Ability	25954	+.19	±4.04	-20.8 to 20.0

*Current dams are registered cows with at least one progeny reported in the "V" or "W" birth year.



Main List of Active Sires

100 VIKING 132P X22514527
2/2/82 S: LAZY BL VIKING 30K
B: CHECK POINT RANCH, OSSEO, MN
O: ARNOLD HILLEREN, PARSHALL, ND

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
99	.42	- 1.2	.68	- 2.1	.63	+ 3.5	.52	+0.05	.08	99	.36	+17.1	+18.1	.38

12 O'CLOCK HIGH X22730864
7/3/82 S: ENFORCER 107H
B: HY BECKMAN & SONS R&D CO., ST. LOUIS, MO
O: KEITHLEY HEREFORD FARMS, FRANKFORD, MO
ROTH HEREFORD FARM, TROY, MO
TRIPLE J FARMS, GLEN ALLEN, VA
THE 12 OCLOCK CLUB, GLEN ALLEN, VA

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
95	.63	+ 1.3	.74	+15.2	.76	+16.6	.68	+0.19	.25	98	.59	+30.1	+22.5	.60

AA KNT WOODROW A7 X21763137
9/6/77 S: KIYIWANA NEW TREND
B: ALLIE HALBERT ASKEW, SONORA, TX
O: J.G. FRANK & SONS, GIDDINGS, TX

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
100	.66	- 0.5	.64	+ 9.7	.74	+ 8.7	.69	0.00	.32	100	.64	+20.9	+16.1	.66

AA R TOP PRIORITY 398 X22794742
7/16/83 S: BT BUTLER 452M
B: ANDREW DUNCAN, WINGATE, IN
O: FIVE POINT PASTURES, GREENSBURG, PA
OAK HILL FARM, PORTLAND, OR
PLEASANT VALLEY FARM, LAMBERTVILLE, NJ

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
100	.57	+ 1.4	.80	+ 6.5	.75	+ 7.4	.55	-0.22	.02	101	.29	+21.2	+17.9	.29

ACE BEAU STICK 96P X22707362
4/4/82 S: STLBRK GILEAD 67K
B: ACE LAND & CATTLE COMPANY, MILLBROOK, NY
O: FRANCIS & JANICE MCDONALD, GARNETT, KS

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
100	.31	- 0.2	.30	- 3.0	.71	- 5.2	.50	-0.04	.01	100	.30	+19.8	+21.3	.32

ACE SOLID GOLD 237R X22831830
12/4/83 S: STERLING
B: ACE LAND & CATTLE COMPANY, MILLBROOK, NY
O: ACE LAND & CATTLE COMPANY, MILLBROOK, NY
MM HEREFORDS, NORTHBORO, IA

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
104	.36	- 0.3	.38	- 7.1	.63	- 6.7	.45	+0.10	.20	102	.27	+15.2	+18.8	.27

ACE VINDICATOR 55P X22612520
3/13/82 S: VINDICATOR
B: ACE LAND & CATTLE COMPANY, MILLBROOK, NY
O: ACE LAND & CATTLE COMPANY, MILLBROOK, NY
MM HEREFORDS, NORTHBORO, IA

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
97	.52	- 1.1	.59	- 8.3	.70	- 8.2	.60	-0.01	.19	98	.50	+16.2	+20.3	.51

ADVANTAGE X21472999
1/17/76 S: ADVANCER 228D
B: SANTA FE RIVER RCH., ALACHUA, FL
O: SANTA FE RIVER RCH., ALACHUA, FL
BEARTOOTH RANCH, COLUMBUS, MT
PAUL DUMONT, VERNON, B.C.

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
93	.85	+ 4.3	.90	+ 8.4	.89	+ 9.6	.88	-0.02	.44	94	.85	+21.9	+17.6	.85

AF GRANITES VICTORY 703 X22756181
3/21/83 S: GRAYSTONE GRANITE
B: A.H. FLETCHER, BURLISON, TN
O: EUGENE R. ANTHONY, RIPLEY, TN

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
99	.24	+ 1.5	.24	- 1.0	.62	- 4.8	.48	-0.01	.23	99	.24	+19.9	+20.4	.25

ALF BEAU VICTOR 56 X21782613
5/20/78 S: BT BEAU VICTOR B89
B: ALFALFA LAWN FARMS, LARNED, KS
O: KENNETH & MARTHA WALKER, FOWLER, KS

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
102	.67	- 0.5	.63	- 4.1	.79	- 2.9	.71	0.00	.27	102	.63	+19.3	+21.3	.64

ANHINGA VIC 37J 69R X22669836
12/8/82 S: RWJ VIC 014 37J
B: ANHINGA FARMS, TALLAHASSEE, FL
O: ANHINGA FARMS, TALLAHASSEE, FL

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
96	.63	- 1.8	.77	- 1.8	.75	-11.3	.69	+0.56	.24	96	.57	+32.0	+32.9	.58

ANHINGA VIC K23 P35 X22512018
12/1/81 S: RWJ J3 VIC E30 K23
B: ANHINGA FARMS, TALLAHASSEE, FL
O: DALE STITH, GUSTON, KY
ANHINGA FARMS, TALLAHASSEE, FL

Calving Ease EPD	ACC	Birth Weight EPD	ACC	Weaning Weight EPD	ACC	Yearling Weight EPD	ACC	Scrotal Circum. EPD	ACC	Maternal Clv. Ease EPD	ACC	Maternal Wean. Wt. EPD	Maternal Milk EPD	ACC
110	.52	- 0.1	.70	+14.7	.66	+15.0	.56	+0.79	.19	105	.41	+20.6	+13.3	.42

Average EPD and Ranges for 1987 Bull Calves

Trait	Avg.	Low	High
Birth Wt.	0.5	-11.7	11.4
Weaning Wt.	-0.2	-40.3	46.7
Yearling Wt.	0.2	-42.5	53.3
Maternal Weaning Wt.	19.3	-10.6	53.5
Maternal Milk	19.4	6.2	35.4

Percentile Breakdown - 1987 Bull Calves

				Maternal	
Percent	Birth Weight	Weaning Weight	Yearling Weight	Weaning Weight	Milk
5%	-2.5	14.1	17.3	30.1	24.9
10%	-1.7	10.6	12.8	27.3	23.4
15%	-1.3	8.3	10.0	25.5	22.5
20%	-1.0	6.4	7.7	24.2	21.9
25%	-0.7	4.9	5.9	23.1	21.3
30%	-0.5	3.6	4.4	22.2	20.8
35%	-0.3	2.4	2.9	21.4	20.4
40%	-0.2	1.3	1.7	20.6	20.0
45%	-0.1	0.4	0.5	19.8	19.6
50%	0.2	-0.5	-0.5	19.1	19.3
55%	0.5	-1.4	-1.4	18.4	18.9
60%	0.7	-2.3	-2.4	17.7	18.6
65%	0.9	-3.2	-3.5	17.1	18.2
70%	1.2	-4.1	-4.6	16.3	17.9
75%	1.5	-5.3	-5.8	15.5	17.5
80%	1.9	-6.6	-7.2	14.6	17.1
85%	2.3	-8.1	-8.9	13.4	16.5
90%	2.9	-10.2	-11.2	12.0	15.9
95%	3.8	-13.8	-14.8	9.6	14.8

SIRE-EVALUATION OF PROVEN ACTIVE SIRES

ANIMAL NAME OWNER	REG. NO.	BIRTH DATE	DISTRIBUTION		BIRTH WT		WEAN WT		YRLG WT		MATERNAL			
			GRPS	PROG	EPD	ACC	EPD	ACC	EPD	ACC	DTRS	MILK EPD	TOTAL EPD	ACC
12145 JAY Goodman, M/M E. T.	93726	01/04/78	21	52	1.3	.59	-3.8	.66	-4.4	.61	14	.2	-1.7	.56
5L MR MAGNUM C B Ranch	130942	03/18/81	17	54	.9	.68	-5.7	.66	13.4	.62	7	1.1	-1.7	.46
651-27M VRR Cole, J. W.	159930	03/15/83	9	89	-2.6	.73	6.7	.71	13.0	.62	10	6.6	10.0	.52
741 PANHANDLER 062• Dan Straka Red Angus	124599	08/14/80	12	102	2.8	.75	18.7	.74	20.6	.66	16	.2	9.5	.58
741 PANHANDLER 189 Gilchrist & Son, Ken, Mueller RA Fm., Panhandle Cattle	137013	08/04/81	11	77	6.3	.74	29.1	.72	54.7	.69	6	5.6	20.1	.47
741 PANHANDLER 248 Panhandle Cattle Co	140381	04/09/82	10	79	2.6	.74	23.1	.71	25.7	.65	6	7.2	18.7	.44
81 CWA 956-805 Byers, Lorrayne C.	135572	02/05/81	9	52	6.1	.66	22.6	.64	40.8	.60	5	1.4	12.7	.44
860 PANHANDLER 124 Bourdon, Mary M., Bourdon, Richard M.	128629	04/08/81	10	90	3.7	.78	33.1	.77	21.8	.75	27	8.7	25.3	.68
ANE JAY 871 835 Glo-Mar RA Fm.	129007	11/16/80	16	44	.8	.64	5.9	.63	9.6	.59	5	10.9	13.8	.42
ANE TUSCAPRIDE 848 Blanton, John B.	129033	12/20/80	7	26	-2.4	.62	19.9	.63	14.7	.58	11	8.4	18.3	.52
ANE UMPIRE 700 Neo-Sho Fms., Enfinger, Alvin H., Virginia Acres Fm.	123114	10/17/79	35	113	.3	.78	11.0	.77	11.7	.74	23	9.3	14.6	.67
ANGELS 710• Angel, R. L.	90052	02/02/77	23	135	1.1	.78	8.0	.79	12.2	.76	44	4.3	8.3	.73
ANGUS GLNA 17 913 Select Sires Inc.	114100	04/01/79	15	26	.6	.61	-.8	.60	6.2	.55	7	1.4	1.0	.47
B30 PATRTS CONTRIBTR Althoff, Duane	106063	02/15/79	17	114	2.5	.81	7.7	.80	6.5	.77	55	-7.9	-4.0	.75
BB 1360 SALEE 3036 Vogler Fms., Robt E.	117657	03/08/80	11	38	-.9	.67	14.2	.65	15.7	.61	9	6.1	13.2	.49
BB 1385 TAW 3085 Randol Reds	117690	04/16/80	10	41	1.0	.63	14.2	.62	-10.3	.54	7	8.9	16.0	.45
BB 1985 BBRED 5040 Beeby, Roy G.	137292	10/14/81	12	83	.3	.68	22.0	.68	7.4	.60	3	4.4	15.4	.36
BB L982 BBRED 5236 Beeby, Roy G.	152077	03/13/83	8	44	5.6	.64	35.9	.62	63.3	.53	2	13.2	31.1	.31
BC PATHFINDER 6• Crane, Bert	105346	09/14/78	11	42	-.7	.50	7.2	.61	16.6	.44	1	6.4	10.0	.27
BCH BIG STEP 3430• Larson, David & Emily	116667	03/27/80	12	69	.2	.73	-.8	.72	2.7	.68	16	2.9	2.5	.59
BCH RCH GRG 0140-291 Basel, Dallis	142956	03/13/82	13	82	2.5	.75	11.8	.73	27.4	.69	17	6.4	12.2	.60
BECKTON DITI 6520 L Forbes, Mrs. Waldo E.	149755	03/17/82	29	87	.3	.76	18.5	.73	35.7	.71	3	10.4	19.6	.36
BECKTON DITO 4374 Forbes, Mrs. Waldo E.	92317	03/24/77	57	165	-.5	.84	4.0	.83	15.4	.81	44	3.6	5.6	.75
BECKTON GISA 4454 Forbes, Mrs. Waldo E.	92329	04/07/77	54	177	1.8	.84	18.4	.83	21.0	.82	51	4.1	13.3	.75
BECKTON JAVELIN 6587 Beckton RA	143752	03/22/82	21	61	1.2	.73	17.4	.71	33.3	.68	5	9.8	18.5	.45
BECKTON JULIAN 6592 Forbes, Mrs. Waldo E.	143856	03/22/82	18	47	-.3	.71	14.9	.69	35.8	.66	3	3.2	10.6	.46
BECKTON KAISER 7143F Forbes, Mrs. Waldo E.	160420	03/27/83	17	38	.7	.67	23.8	.64	47.1	.62	0	1.8	13.7	.30
BECKTON MANI 4754 Forbes, Mrs. Waldo E.	103435	03/25/78	50	146	-1.8	.83	7.9	.82	10.6	.80	42	3.2	7.2	.73
BECKTON NEPTUNE 6616S Forbes, Mrs. Waldo E.	143796	03/24/82	20	40	.7	.69	11.5	.66	18.6	.63	6	9.7	15.4	.43
BECKTON NEVA 5342 Beckton RA	113305	04/18/79	26	46	-.3	.71	1.8	.70	9.2	.67	11	11.4	12.2	.55

* Category I-B † Category II • Dead

February 1988

BANNER 00000758 (FULLBLOOD)
7/2/77 **S:** LIBAN
B: COMO RANCHES, LOWRY CITY, MO
O: SHADY RIDGE STOCK FARM, RED DEER, ALTA
SCATTERED OAKS RANCH, BLEIBLERVILLE, TX
RANDALL INC-969 RANCH, BROADUS, MT
BANNER SYNDICATE, RED DEER, ALTA

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+1.4	.71	+12.7	.68	+12.6	.65

BJC PRAIRIE JACK 3N 00101751 (FULLBLOOD)
3/12/81 **S:** KARDINAL
B: BLACK JACK CATTLE CO LTD, COCHRANE, ALTA
O: ROBERT SCHNELL, LEMMON, SD

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+0.3	.50	−11.7	.51	+ 2.1	.30

EPR AMERICAN EXPRESS 31P 00000650 (FULLBLOOD)
2/18/82 **S:** LEGACY
B: E & P RANCH, CALGARY, ALTA
O: E & P RANCH, CALGARY, ALTA
FIGURE 4 SALERS, ECKERT, CO
TEXAS AM EXPRESS SYNDICATE, WHEELOCK, TX

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+0.6	.61	− 1.3	.55	− 0.6	.45

EPR LEADER 6L 00000383 (FULLBLOOD)
3/22/79 **S:** MR APOLLO KRS 4H
B: GREENSPAN RANCHES, OLDS, ALTA
O: KENNEDY RANCH, ALLIANCE, NE
P M T LAND & CATTLE, STILLWATER, OK
SUNRISE W SALERS, STAFFORD, KS

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
−0.6	.63	+ 1.4	.60	+ 6.2	.60

EPR MAGNIFIQUE 7M 00000600 (FULLBLOOD)
2/29/80 RED **S:** LEO
B: E & P RANCH, CALGARY, ALTA
O: E & P RANCH, CALGARY, ALTA
CEDAR HILLS FARMS, ST CHARLES, IA
BACKGAMMON SALERS, CALGARY, ALTA

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+0.6	.56	− 5.3	.54	+ 4.3	.54

EPR MASTERCHARGE 19M 00000382 (FULLBLOOD)
4/23/80 **S:** LEO
B: E & P RANCH, CALGARY, ALTA
O: LAZY L-5 RANCH COMPANY, CRESTON, IA

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+2.4	.66	+ 5.6	.63	− 9.3	.59

EPR NOTAIRE 26N 00000595 (FULLBLOOD)
3/21/81 RED **S:** LEO
B: E & P RANCH, CALGARY, ALTA
O: FRANK WHITHAM, LEOTI, KS
ROBERT SCHNELL, LEMMON, SD

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+2.5	.50	+14.6	.53	+ 0.8	.40

EPR PHOENIX 37P T00000445 (FULLBLOOD)
2/23/82 RED **S:** LEGACY
B: E & P RANCH, CALGARY, ALTA
O: LACEY RANCHES, DRUMMOND, MT

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
−3.4	.58	− 2.0	.52	+ 2.3	.39

EPR PRIDE AT BENT SPEAR 00000999 (FULLBLOOD)
1/27/82 RED **S:** LEGACY
B: E & P RANCH, CALGARY, ALTA
O: MACDONALD RANCHES, BISMARCK, ND

Birth EPD	Birth ACC	Weaning EPD	Weaning ACC	Maternal EPD	Maternal ACC
+2.5	.57	− 4.0	.56	1.4	.27

Sire's Name Registration Number Birthdate	Bull's Sire Maternal Grandsire	Breeder's Name Owners	Progeny Herds	Birth Weight EPD ACC	Weaning Weight EPD ACC	Yearling Weight EPD ACC	Maternal Milk EPD ACC	Maternal Total EPD	Maternal DTGs
AF Deerpark Dividend 79 3705-885 3-20-79	S: Deerpark Leader 13th MG: Salterstown Pirate	B: George Alden O: George Alden Ronald Gooch 7M Polled Shorthorns	42 8	+0.6 .72	+3.2 .71	– –	-2.2 .58	-0.6	24
AF Dividend 82 3743-780 1-19-82	S: Deerpark Leader 13th MG: Salterstown Pirate	B: George Alden O: Gordon Brockmueller	17 1	+1.5 .53	+7.1 .60	– –	– –	–	–
AF Dividend's Impact 3723-191 3-2-81	S:Deerpark Leader13th MG: Hub's Impact Two	B: Green Ridge Shtns O: Schrag Shtn Farms George Alden	218 13	+2.5 .82	+14.0 .82	+32.5* .74	+6.7 .61	+13.7	26
AF Dividends Robin 2nd 3703-846 1-4-80	S: Deerpark Leader 13th MG: Foxdale Favorite Robin	B: Ronald Irving Alden O: John W. Murray	102 4	+0.4 .81	+16.6* .79	+19.7 .51	+7.3 .67	+15.6	44
AF Improver 032 x3712-547 5-12-80	S: Deerpark Improver MG: Gallant Leader	B: Robert & Ronald Alden O: Walter J. Hoyt & Sons	72 1	+1.5 .75	+9.6 .74	– –	+5.0 .50	+9.8	16
AF Majestic Dividend 3727-250 10-6-80	S: Deerpark Leader 13th MG: Shannon Magnificent	B: George Robert Alden O: George Robert Alden Walter J. Hoyt & Sons	30 1	+0.1 .72	+17.2* .69	– –	+3.3 .55	+11.9	25
AF Mr Prudential 3765-085 1-9-83	S: AF Dividend's Impact MG: Tops 66 Casul's Model	B: George Alden O: M&H Cattle Co.	155 12	+3.3 .80	+14.7 .80	+24.3 .58	+6.1 .55	+13.5	20
AF Paramont 3776-038 9-5-83	S: Deerpark Leader 13th MG: Deerpark Improver	B: George Alden O: George Alden Rex Cates & Family	29 7	+1.8 .57	+8.4 .56	– –	– –	–	–
Abraham x3587-118-m 2-20-75	S: Columbus MG: Adam	B: Graham Land & Lvstk O: Roger Steiger Dean Steck	28 4	-0.6 .66	-5.9 .64	– –	– –	–	–
AR SU LU Caesar x3700-277 5-2-78	S: Deerpark Leader 13th MG: Ball Dee Perfect Count	B: Arthur Bakenhus & Sons O: Arthur Bakenhus & Sons	41 1	+0.4 .71	+10.2 .72	+19.0* .62	+3.5 .60	+8.6	26
AR SU LU Marksman x3780-610 3-3-84	S: AR SU LU Caesar MG: Deerpark Improver	B: Arthur Bakenhus & Sons O: Arthur Bakenhus & Sons	22 1	-2.3 .53	+11.0 .51	– –	– –	–	–
Ayatollah *AR2336 11-7-79	S: Viking Valley Chief MG: Lago's Cache Winner	B: John Haugen O: Graham Land & Lvstk	189 57	+0.8 .83	+14.0 .82	+36.9 .59	+7.5 .62	+14.5	27
B 139 Jess 79 x3694-331 4-5-79	S: Mill Brook Ransom 139 MG: MC White Jester	B: Berg's Shorthorns O: Walter J. Hoyt & Sons	84 1	+0.7 .79	+6.9 .79	+15.1 .55	+0.9 .66	+4.4	44
BBS Hope's Prime Time ET 3777-819 11-2-83	S: Deerpark Improver 2 MG: Deerpark Leader 18th	B: Buchholz Bros. Shtns O: Prime Time Syndicate	94 16	+2.8 .74	+8.3 .71	– –	– –	–	–
BGR Improver 106G 3691-144 4-2-75	S: Deerpark Improver MG: Deerpark Leader	B: Beef Genetics Research, Inc. O: Ron Kaufman	21 1	+1.5 .69	-0.4 .69	-8.0 .65	+2.8 .58	+2.6	27
BP Knight's Honor 3740-443 5-2-81	S: Mill Brook Ransom G9 MG: Seven T's Luck O The Irish	B: The R. Lee Johnsons O: Walter J. Hoyt & Sons	105 1	+0.6 .77	+10.1 .75	– –	– –	–	–
B Golden Boy 81L x3735-168 7-4-81	S: Highfield Leader 78th MG: Weston Iron Horse	B: Berg's Shorthorns O: Jim & Alene McCollum	36 2	+1.2 .56	+8.6 .57	– –	– –	–	–
B Image Fashion 3739-004 5-13-81	S: Highfield Leader 78th MG: Rolyn Image	B: Jason Thomas Berg O: Walter J. Hoyt & Sons	46 1	+0.1 .67	+3.9 .64	– –	– –	–	–
Bern-A-Dale Nonstop 3746-701 5-17-82	S: Waukaru G9 Referee MG: B Romeo Dandy	B: Bern-A-Dale Shtns O: Walter J. Hoyt & Sons	21 1	+0.1 .54	-3.0 .53	– –	– –	–	–
Brentwood Guinness x3728-492 4-11-81	S: Deerpark Improver 2 MG: Kenmar Standard 19X	B: Roger Applegate O: Roger Applegate Herbert R. Krug Scott's Shorthorn Farms	116 2	+1.9 .71	+8.8 .76	– –	– –	–	–
Brentwood Prime Rate x3748-315 4-19-82	S: Deerpark Improver 2 MG: Four Point Count	B: Roger Applegate O: Leemon Stock Farm	54 1	+1.3 .63	+7.9 .61	– –	– –	–	–
CB Columbus 399 3680-714-m 4-10-77	S: Westward Ho Columbus MG: Cedar Crest Dan	B: 3 Crown, Inc. & Chapman Bros. O: William Foster	11 1	-2.3 .50	-0.7 .50	– –	– –	–	–
CCS Explorer 1492 x3661-894-m 3-7-78	S: Columbus MG:Stone Oak Proud Boy	B: Don Cagwin O: Byland Polled Shtns	41 3	-0.3 .67	-6.5 .67	– –	– –	–	–

* Designates trait leaders (among the top 10 sires for each trait, with minimum accuracies of 0.60).

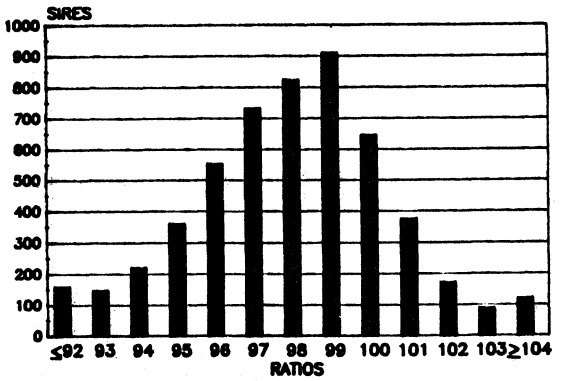
AMERICAN Simmental® ASSOCIATION

Simmental Sires

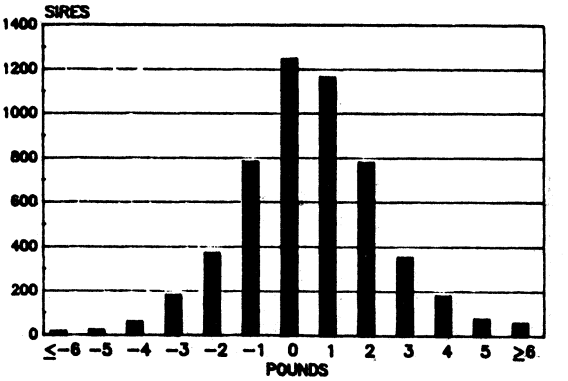
1989 Official Sire Summary

Horned Polled Status	NAME OF BULL BULL'S SIRE DAM'S SIRE	Country Currently Registered To City, State	Bloodtype Status	ASA Number	Birthdate M/D/Y		FIRST CALF CALVING EASE	BIRTH WEIGHT	WEANING WEIGHT	YEARLING WEIGHT	MATERNAL FIRST CALF CALVING EASE	MATERNAL WEANING WEIGHT	MATERNAL MILK
P	0618S SWITZ POL BIG BUD (P/S) ALPINE POLLED CHALLENGER (P)	ROBERT & MONICA DOYLE DANVERS,MN		1027800	04-10-84	EPD ACC	97.9 .17	1.6 .42	2.3 .40	14.9 .35	100.0 .16	5.3 .19	4.2 .18
H	0W SIGNAL SIGNAL (H) EXTRA STRETCH 1F (H)	CIRCLE BAR W HAY & CATTLE SCHUYLER,NE	PCB	810284	01-18-82	EPD ACC	94.4 .18	-.4 .35	-4.2 .27	-1.7 .27	105.8 .17	-1.4 .19	.7 .18
P†	10 KARET GENERATION III (P) SIGNAL (H)	WOODBOURNE FARM INC WARRENTON,VA		1003410	04-11-84	EPD ACC	99.0 .17	-1.0 .35	-5.2 .31	1.0 .28	103.3 .17	1.8 .19	4.4 .18
H	102K SBL PARISIEN 23G (H) BBM DOMINO 2B (H)	DANNY JOE AMIDEI NOVINGER,MO		536337	02-27-78	EPD ACC	98.0 .11	-.5 .52	-9.8 .43	-17.8 .36	100.9 .12	-7.9 .31	-3.0 .28
H	108M MCR MONARCH 1D (H) SIGNAL (H)	ELDEN J REICHMAN BIG SPRINGS,NE	BTF	668290	02-28-80	EPD ACC	106.0 .22	-4.0 ★ .73	-10.4 .65	-18.2 .60	104.2 .19	7.5 .29	12.7 .28
	112L SIGNAL (H) USLAR (H)	MARLA BURNHAM HELENA,MT		597238	03-05-79	EPD ACC	96.8 .24	1.5 .76	13.0 ★ .68	21.7 .68	101.2 .28	4.6 .50	-1.9 .46
H	15 MCR MONARCH 1D (H) DBW ACHILLES 67F	KC SIMMENTAL RANCH ELLENSBURG,WA		993935	02-06-84	EPD ACC	100.2 .17	-2.2 .38	-16.9 .33	-27.5 .30	103.3 .16	1.8 .19	10.3 .18
H	1516 SHEPBU 542M COPPER KING (H) BAR 11 UELI (H)	LANNY EVANS HAYES CENTER,NE	PCB	634158	03-30-80	EPD ACC	98.5 .21	1.0 .55	5.8 .45	11.5 .42	102.2 .21	2.4 .29	-.5 .26
H	1516 SHEPBU 630R SIGNAL (H) SIEGFRIED (H)	LOVELL RANCH FRANKLIN,NE		924738	04-22-83	EPD ACC	97.0 .18	5.6 .48	18.1 .43	38.8 .37	107.2 .17	8.0 .20	-1.1 .19
H	1516 SHEPBU 65R ABR SIR ARNOLD G809 (H) MCR MONARCH 1D (H)	LOUP STOCK CO INC MASON CITY,NE	PCB	924751	04-09-83	EPD ACC	101.4 .18	-.9 .52	15.1 .46	28.3 .45	106.5 .17	5.7 .22	-1.8 .20
H	1516 SHEPCO 540S C&B WESTERN (H) SIEGFRIED (H)	OPEN BOX ARROW RANCH ASHBY,NE		1026413	03-30-84	EPD ACC	94.0 .17	1.4 .43	12.5 .39	21.3 .34	100.6 .17	8.3 .19	2.1 .19
	16P CIMARRON DUKE 715 (H) CEZON (H)	RIA RANCH SIMMENTALS COLLBRAN,CO		832816	04-13-82	EPD ACC	97.5 .12	.1 .36	-10.8 .31	-9.8 .27	103.0 .11	-4.4 .17	1.0 .16
	17R LANGDON'S DOVEA HUNTER (H) POLLED PREFERENCE (P)	LOWELL PRENTICE WESSINGTON,SD		923643	03-30-83	EPD ACC	105.4 .16	-2.2 .40	-3.5 .33	-3.9 .30	92.9 .18	4.8 .25	6.5 .22
H	205R JOHNNY REB'S PRIDE PB19 (P) EXTRA (H)	GARY SKRETTEBERG CARSON,ND		913120	04-23-83	EPD ACC	93.0 .19	1.7 .37	14.6 .32	17.8 .30	101.8 .17	1.2 .21	-6.1 .19
	21 BENIGN JASPERS PAL SHAWEST JASPER 4J (H) HAMLET	WALLACE FARMS MENDENHALL,MS		874695	01-03-82	EPD ACC	97.4 .12	-2.4 .39	-3.1 .32	3.8 .28	100.3 .11	-.5 .14	1.1 .14
H	220R DBW ACHILLES 67F SALZ (H)	HIEGGELKE STOCK FARM LISBON,ND		1000523	04-22-83	EPD ACC	100.9 .16	-1.4 .32	9.0 .37	10.9 .32	94.0 .14	4.5 .18	.0 .18
H	248N TEARDROP POPE D S SWITZ GAL TEARDROP (H) USLAR (H)	POPE SIMMENTALS ST IGNATIUS,MT		720399	04-01-81	EPD ACC	97.5 .11	1.5 .65	-5.6 .51	-.1 .41	97.5 .10	1.9 .19	4.7 .18
H	2624 DUKE 16M ABRICOT (H) LACOMBE ACHILLES (H)	MOORE'S SIMMENTAL FARM ROSE HILL,IA	PCB	648918	04-09-80	EPD ACC	97.2 .18	.7 .43	-13.3 .36	-14.3 .34	102.5 .18	6.3 .27	13.0 .24
P†	2J POLL SIEGFRIED N75 POLLED SIEGFRIED J8004 (P) BAR 11 UELI (H)	PIONEER SIMMENTAL BREEDERS THROCKMORTON,TX	PCB	760099	03-03-81	EPD ACC	93.1 .31	.3 .80	16.3 ★ .74	41.4 ★ .69	107.2 .27	4.1 .35	-4.1 .34
H	2J R176 GW GALANT 070N (H) COPPER KING (H)	JOHN WENDT LIMA,MT		968130	04-28-83	EPD ACC	99.8 .13	-2.3 .37	-6.6 .28	-8.3 .25	97.5 .12	-1.3 .17	2.0 .16
H	2J T-101 GW GALANT 070N (H) FUR LIKENESS (H)	JOHN & JENNESS VAN DYK THREE FORKS,MT		1047266	03-19-85	EPD ACC	98.2 .11	-1.2 .41	3.4 .34	5.1 .29	94.6 .10	1.9 .15	.2 .14
H	2J T-192 E J ABRICOT 52 (H) COPPER KING (H)	JOHN & JENNESS VAN DYK THREE FORKS,MT		1093615	04-18-85	EPD ACC	101.3 .10	-.2 .40	1.1 .34	6.9 .29	99.7 .10	7.0 .13	6.4 .12
	2S S10 PRIDE OF PRICKLY PEAR (H) BEAT (H)	HILLS RANCH INC STANFORD,MT		1053067	03-15-84	EPD ACC	94.0 .17	.0 .50	-3.6 .45	-6.7 .41	108.3 .16	.9 .20	2.8 .19
H	3132 SHEPBU 165R C&B WESTERN (H) SHEPBU 895J (H)	LOVELL RANCH FRANKLIN,NE		924749	04-06-83	EPD ACC	93.6 .16	3.8 .43	14.3 .37	24.0 .32	99.3 .16	7.7 .19	.6 .18
P	338P RICH GOLD (P) MF POLL KAT I (P)	DALE L SCHMEECKLE GOTHENBURG,NE		848061	04-04-82	EPD ACC	97.7 .20	-1.1 .65	1.7 .57	15.4 .59	101.0 .16	-1.5 .24	-2.4 .22
H	3C MR HUNTER 11 LANGDON'S DOVEA HUNTER (H) KING ARTHUR (H)	WOOD RANCH-GLEN P WOOD SHERIDAN,MT		920715	02-01-83	EPD ACC	101.6 .16	-.5 .21	9.3 .35	20.4 .31	95.2 .16	12.3 .18	7.6 .18
H	3C TRUMP 5033BWF EXTRA BLACK (P'S) HIGH INTEREST (H)	CHRISTENSEN BROS SIMMENTAL WESSINGTON SPR,SD		1086246	03-18-85	EPD ACC	98.9 .16	-.1 .44	6.6 .37	11.7 .34	101.0 .16	-.8 .19	-4.1 .18
P/S	3N1 EXTRA BLACK (P'S) MR XP (H)	STEVE L OR MARY P GLEASON MAPLE HILL,KS		730099	02-25-81	EPD ACC	98.0 .17	-.1 .35	-13.8 .31	-24.4 .29	102.9 .17	-13.4 .27	-6.5 .24
	3P ROCKY EDN DESTINY (H) FAME (H)	CANADA CROCKETT K RHINE SAN LUIS OBISPO,CA	PCB	1074448	02-17-84	EPD ACC	97.9 .15	3.5 .48	31.7 .43	56.7 .42	100.4 .15	17.0 .19	1.2 .18
H	460S SS GENERAL BARRISTER (H) SALZ (H)	POPE SIMMENTALS ST IGNATIUS,MT		985683	02-17-84	EPD ACC	101.1 .14	1.4 .55	1.1 .31	-4.0 .28	95.3 .14	-9.2 .17	-9.8 .16
EPD RANGE FOR ALL SIRES EVALUATED						**LOW** **HIGH**	79.3 119.8	-11.7 9.4	-58.8 49.6	-86.1 76.4	78.0 114.0	-24.9 38.9	-25.1 24.2

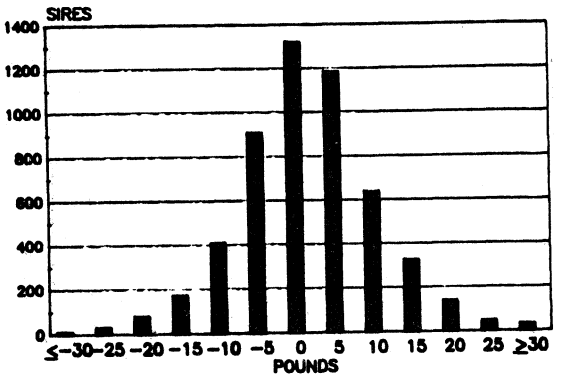
First-calf Calving Ease EPDs



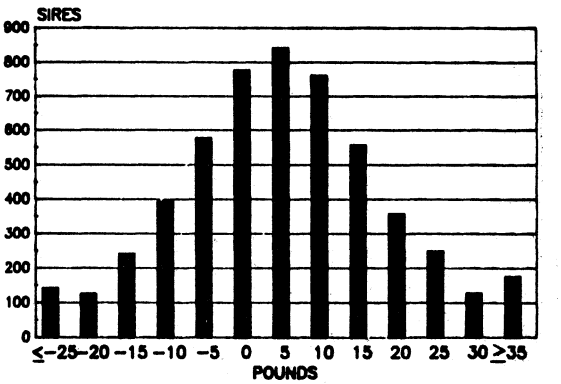
Birth Weight EPDs



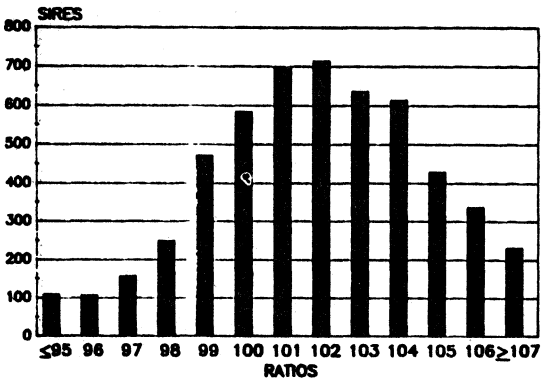
Weaning Weight EPDs



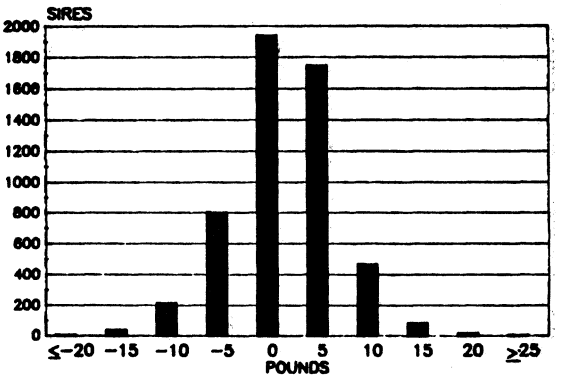
Yearling Weight EPDs



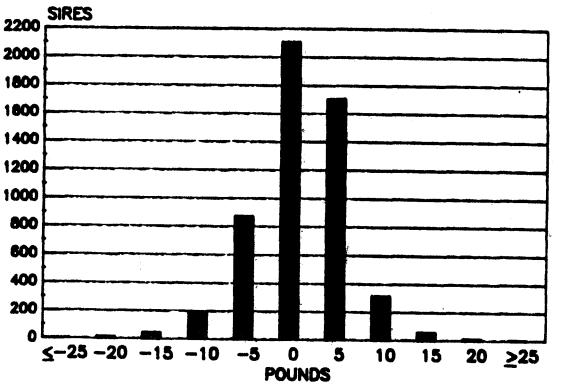
Maternal First-calf Calving Ease EPDs



Maternal Weaning Weight EPDs



Maternal Milk EPDs



ASTOR'S JUPITER 661M M010968 (FULLBLOOD)
04/26/80 HORNED S: ZORRA BEAVER'S JUPITER
B: MAR-BET FARM, SULLY, IA
O: MAR-BET FARM, SULLY, IA
PAUL M SIEVERT, MEDINAH, IL

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	+1.1	+4.5	+5.1	-3.3
RANK:	E	B	B	E
ACC :	.61	.56	.22	.01
HRDS:	3	2	2	1

DFS: 9 DGTRS: 7

AZTEC ROCKER M010574 (FULLBLOOD)
04/23/74 HORNED S: EDMESTON ROCKER 18TH
B: BIG BEEF HYBRIDS INC, JOPLIN, MO
O: RIVER VALLEY RANCH, ST FRANCIS, KS

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	-0.3	-10.6	-24.7	-7.9
RANK:	C	F	F	F
ACC :	.67	.64	.53	.22
HRDS:	6	7	4	4

DFS: 6 DGTRS: 49

BOWTELL CHARLES 23H M010830 (FULLBLOOD)
05/14/76 HORNED S: DUNTERTON 252
B: BOWTELL FARMS, VERMILION, ALTA
O: HORSESHOE RANCH, EDEN PRAIRIE, MN

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	+1.3	-8.4	-19.8	-2.7
RANK:	E	E	F	E
ACC :	.71	.66	.62	.11
HRDS:	2	2	2	5

DFS: 6 DGTRS: 23

CORNHUSKER JESTER M011080 (FULLBLOOD)
04/04/81 HORNED S: SR 40J
B: SCHAFFER RANCHES, EMMET, NE
O: SCHAFFER RANCHES, EMMET, NE

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	+0.9	-2.8	-14.5	-3.7
RANK:	E	D	F	E
ACC :	.67	.64	.52	.01
HRDS:	5	4	1	2

DFS: 10 DGTRS: 4

CS BARON FLASH 7TH M010730 (FULLBLOOD)
10/03/77 HORNED S: WINSOR BARON
B: SCULLY ESTATES LTD PRTNRSHP, BEATRICE, NE
O: TERPSDALE FARMS, LYNNVILLE, IA

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	-0.6	-10.8	-16.4	+0.3
RANK:	C	F	F	D
ACC :	.32	.54	.26	.01
HRDS:	2	2	1	2

DFS: 6 DGTRS: 9

CS GENERAL HYADES 11TH M010674 (FULLBLOOD)
04/14/76 HORNED S: SEXTON HYADES 41ST
B: SCULLY ESTATES LTD PRTNRSHP, BEATRICE, NE
O: ANGELENA RANCH, LITTLE FALLS, MN

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	-0.8	-1.4	-6.0	-9.0
RANK:	B	D	E	F
ACC :	.82	.78	.73	.38
HRDS:	5	5	5	10

DFS: 7 DGTRS: 64

DEVON DELL BARTON M010808 (FULLBLOOD)
05/09/79 HORNED S: WINSOR BARON
B: TERRIL MOORE, SASKATOON, SASK
O: SCHAFFER RANCHES, EMMET, NE

	BIRTH	WEANING	YEARLING	MATERNAL
EPD :	+2.3	-0.5	-0.5	+1.0
RANK:	F	D	D	C
ACC :	.76	.72	.65	.10
HRDS:	4	3	2	1

DFS: 7 DGTRS: 22

PROGENY PROVEN SIRES

Name of Bull Date of Birth	H P S	ATA Reg Number	Sire Dam Dam's Sire	%	Current Owner & Address	Birth Wt EPD ACC	Weaning Wt EPD ACC	Year Wt EPD ACC	Milk EPD ACC	Total Mat EPD	CE Dir EPD ACC	Tot CE EPD ACC	# of Prog	# Cont Groups	#DIP
ALPIN 2/27/71	H	1	SOLEIL QUERELLE	FB	ROUNDUP RANCH CO OP LIMITED BOX 363 FORT MACLEOD, AL CANADA	-0.44 0.97	-0.59 0.97	-0.67 0.97	2.86 0.97	2.56	99.94 0.97	99.82 0.97	9598	572	4067
ALPINE ISTAMBUL VEE 200L 4/ 5/79 * Trait Leader *	H	72	ISTAMBUL JUMELLE	FB	TOMS TARENTAISE RANCH INC HC 74, BOX 7025 BAKER, MT 59313	-2.14 0.74	-13.02 0.74	-17.34 0.73	-4.77 0.56	-11.28	107.11 0.66	103.27 0.56	81	19	16
ATTILA 11/27/73 * Trait Leader *	H	16	ATTILA TURENNE PACIFIQUE	FB	AMERICAN BREEDERS SERVICE RT 1 DEFOREST, WI 53532	3.05 0.86	20.00 0.86	24.62 0.86	6.17 0.83	16.17	84.72 0.85	91.60 0.83	378	63	137
BAR FOUR BOBY J3 1/12/76	H	21	BOBY BAR FOUR ILLINE ASTERIX	FB	GENE TODD 9477 WALKER ROAD BELGRADE, MT 59714	0.73 0.80	-11.06 0.80	-5.74 0.79	-19.40 0.74	-24.93	94.10 0.79	96.82 0.74	271	28	56
BAR FOUR MUY MACHO 3/29/77	H	22	BOBY BAR FOUR ILLINE ASTERIX	FB	MOORE RANCH JORDAN STAGE 22 MILES CITY, MT 59301	1.27 0.74	15.23 0.74	17.22 0.73	-6.30 0.64	1.31	89.85 0.69	94.52 0.64	119	25	27
BECKER'S DIAMOND B BRIF 4/12/79 * Trait Leader *	H	82	BRUTUS BIG M MISTY 141J	FB	BECKERS DIAMOND B TARENTAIS RR 1 BOX 139 ANAMOOSE, ND 58710	0.51 0.76	18.79 0.76	28.59 0.76	-1.25 0.60	8.13	93.80 0.70	96.66 0.60	153	53	18
BECKERS DIAMOND B BUDDY 6/10/77	H	63	IROUNE LYONNE 2	FB	SAM BROSSART 213 HERITAGE CIRCL RUGBY, ND 58368	0.16 0.80	-0.29 0.80	5.44 0.80	-3.48 0.75	-3.63	100.96 0.79	100.32 0.75	144	36	59
BELLIQUEUX 11/27/72	H	2	VERDUN UGIRE KAOLIN	FB	TAEGERS OAK GROVE FARMS RT 4 WEST BURLINGTON, IA 52655	2.22 0.92	-0.72 0.92	-3.69 0.92	-3.19 0.90	-3.56	86.66 0.91	92.72 0.90	1017	192	358
BETA 6/22/75 * Trait Leader *	H	15	BRUTUS ISERE KABOUL	FB	J BAR K ACRES ROUTE 2, BOX 139 CORNING, IA 50841	0.92 0.87	-6.61 0.87	-9.32 0.87	6.26 0.84	2.95	93.71 0.87	96.61 0.84	545	43	142
BIG M MARS 3L 10/11/79	H	88	ALPIN EVD MISS LUTIN 883J	FB	CUMMINGS TARENTAISE 1109W. USTICK RD. CALDWELL, ID 83605	-0.25 0.81	-14.68 0.81	-20.02 0.80	0.61 0.57	-6.72	95.90 0.70	97.76 0.57	182	45	13
BLENDER 5/ 7/77 * Trait Leader *	H	42	IROUNE LYONNE 2	FB	WANDLING BROS BOX 97 MABTON, WA 98935	0.05 0.80	11.16 0.80	13.34 0.80	6.39 0.76	11.97	93.46 0.80	96.48 0.76	133	22	61
BOBY 11/30/72	H	3	KABOUL QUENOUILLE NESTOR	FB	WAITE RANCHES BOX 40 LENAPAH, OK 74042	1.20 0.95	8.91 0.95	8.47 0.95	-1.95 0.93	2.50	88.33 0.95	93.67 0.93	2976	432	908
BOBY'S SUCCESSOR 4/20/78 * Trait Leader *	H	57	BOBY JOLIE	FB	H DALE NYSTROM & SONS RT 2, BOX 176 NEW ROCKFORD, ND 58356	0.88 0.82	15.45 0.82	24.99 0.81	-3.90 0.73	3.81	87.31 0.77	93.09 0.73	164	77	40
BOOTHE ROUNDUP 4H 7/ 7/76 * Trait Leader *	H	29	BRUTUS ISERE KABOUL	FB	WADE WARNEKE BOX 65 CHRISTINA, MT 59423	-0.06 0.70	8.99 0.70	5.12 0.70	5.56 0.67	10.06	103.52 0.70	101.57 0.67	65	4	31
BRAVA 7/15/76	H	24	BRICOLE JAVA VENUS	FB	W LAZY HEART RANCH RR 1 BOX 20 CHASELEY, ND 58423	-0.64 0.82	10.30 0.82	11.35 0.81	0.58 0.76	5.73	96.67 0.81	98.16 0.76	181	18	63
BRICOLE 11/22/72	H	6	KABOUL PRUSSE	FB	MAURISE U OR CYNTHIA DANKS TWIN BUTTES ROUTE HALLIDAY, ND 58636	-0.33 0.92	-4.54 0.92	-6.20 0.92	-0.11 0.90	-2.38	99.01 0.92	99.35 0.90	1067	148	401
BRUTUS 11/24/72 * Trait Leader *	H	5	VAILLANT UPSANIA LURON	FB	D M MILLIONS & SON BOX 373 CARNDUFF, SK SOC OSO	2.41 0.93	-0.44 0.93	3.69 0.92	7.19 0.91	6.96	87.66 0.93	93.29 0.91	1471	194	431
C-C 100M 3/30/80	H	19393	IF 123C-C1001K ISTAMBUL	PB	CNS TARENTAISE RR 1 BOX 108 BERGEN, ND 58792	-0.54 0.72	-6.99 0.72	-7.41 0.71	3.13 0.55	-0.36	99.57 0.69	99.63	69	23	15

DETERMINING BULL FERTILITY

Nolan R. Hartwig, DVM
Extension Veterinarian
Iowa State University

Historically, bulls were evaluated almost exclusively by type and conformation. More recently, use of production data has become much more common. Too often, however, little attention is paid to the major function that the bull is asked to perform: "Can he breed cows?" Episodes of sterility are common. It is important that bulls will vigorously seek out females in heat, mate successfully, and deposit fertile semen in the vagina. Subfertile bulls can breed a few cows but will not cover the number of females in the time desired. The implications of infertility are most dramatic in the single sire herd, but are economically important to seed stock and commercial producers alike, regardless of herd size. Problems with infertility can be avoided by attentive management and by correctly performing breeding soundness examinations performed prior to the breeding season. Approximately 11% of yearling bulls are either sterile or subfertile at 12-14 months of age. Breeding soundness examinations show that 4% of proven sires develop serious fertility problems between breeding seasons.

The Guaranteed Breeder

Bulls are often sold as guaranteed breeders. This is, in effect, a warranty that a bull will perform satisfactorily. Several questions should be asked when a bull is sold with this guarantee, and this information should be in writing in case fertility problems do occur. Some of these questions are:

1. For how long is the bull guaranteed?
2. Is the guarantee valid if the bull breeds a few cows but is subfertile?
3. Who determines that the bull is an unsatisfactory breeder?
4. Did the bull have a Breeding Soundness Examination performed prior to sale?
5. Must a Breeding Soundness Examination be performed to prove that the bull has a fertility problem?
6. If the bull is unsatisfactory, is he replaced or is a cash settlement possible?
7. What happens if the bull develops problems a few weeks after purchase?

Most of these problems can be avoided if a Breeding Soundness Examination (BSE)is performed prior to sale. Buyers should insist on this. The statement "Guaranteed Breeder" means little without a BSE.

Libido Testing

Fertility requires that a bull is both physically capable of impregnating cows and has the desire, or libido, to do so. A breeding soundness examination will insure that a bull is physiologically fertile, and, when professionally done, will identify many physical deformities such as feet, leg, and other problems with the reproductive organs that would cause a bull to eventually stop mounting cows. Thus the breeding soundness exam does help identify those physical problems that can damage libido, but does not specifically identify or evaluate libido itself. Libido testing is possible by exposing bulls to several restrained heifers in heat and quantifying the frequency of mounting and general vigor of sexual activity. This procedure is very involved and is not practical in most situations.

The producer, however, can evaluate libido by observing bulls in the breeding pasture. This is especially important the first few days after a bull is turned out with cycling females.

Young bulls are often timid, but become more aggressive later. When several bulls are together, aggressive bulls may dominate more timid ones and actually breed almost all of the cows. Some bulls will "cover" a herd of cycling females very well, aggressively seeking out all females in heat. Others will identify one cow in estrus, following and mounting her frequently while ignoring other females in heat. At any time during the breeding season, bulls can develop problems such as feet and leg injuries, infections, or other problems that can cause either libido problems or directly affect fertility. Breeding activity, including date cows are mounted, vigor of breeding, repeat breeding on successive heats, and other factors should be observed and recorded throughout the breeding season.

The number of females that a bull can cover varies enormously between individuals. It should be remembered that in a given herd, about 5% of the females are in heat at any one time. Size of the breeding pasture, physical condition of both bulls and females, weather conditions, and other factors affect the number of cows each bull can cover. The following table of females per bull should only be considered as a guideline:

Females Per Bull in the Breeding Herd

Yearling bull	10-15
Two years old	15-20
Thrree years (mature)	30-35

The Breeding Soundness Examination

Veterinarians primarily receive requests to perform breeding soundness examinations on bulls from owners who have had reproductive problems in the past, prior to the upcoming breeding seasons, from prospective buyers and sellers, and when a bull is actually suspected of having a problem. Many producers request a "semen test". A breeding soundness examination is a complete examination of the animal, including, but not restricted, to evaluation of the semen. Just semen testing a bull and not performing a complete breeding soundness examination is misleading, results in a false sense of security, and is worse than not doing any examinatin at all. Producers should understand the basics of the BSE and insist that it is done completely, thoroughly, and professionally.

There are four major components of a BSE:

1. History
2. General physical examination
3. Detailed genital tract examination
4. Collection and analysis of representative semen samples

History

History is important as a predictor of fertility. Previous disease episodes and vaccination history should be recorded. Since sperm production is a continuous process, disease such as pneumonia can affect semen quality for several weeks. Bulls with damaged lungs from severe bouts of pneumonia lack stamina and are, in effect, subfertile. Subfertile bulls have the ability to breed some cows, but the capability for covering a herd of females and breeding them in a timely manner is significantly diminished. Technically such bulls are not sterile, but they are not satisfactory breeders.

The actual breeding history is of great value. The number and frequency of previous breedings, conception rates, and normality of offspring should be recorded. This information should be used to help interpret results of the actual examination.

Physical Examination

The physical examination may be more important in predicting the breeding potential of a bull than any other factor. Bulls with undesirable characteristics or abnormalities can be eliminated without collecting and ana-

lyzing semen. Masculinity, movement and gait should be observed carefully before the bull is restrained in a squeeze chute. Lameness may cause a bull to lie down a great deal, so that normal temperature regulation of the scrotum and testicles does not occur. It is common for lame bulls to have diminished semen quality. Bulls with foot, leg, or back pain will not mount and breed cows.

Permanent identification such as a tattoo of the bull is critical and is often overlooked. The veterinarian performing the examination should require this. If the owner refuses to allow permanent identification, this should be recorded on the examination form. This precludes the possibility of switching bulls by unscrupulous dealers.

The eyes are examined for pinkeye scars, cancer eye, or other lesions that can affect the vision and therefore the breeding potential of the bull. Bulls should have normal teeth. The coat is examined for evidence of hair loss, external parasites, and other abnormalities. The coat reflects the general health and management level of the herd. The feet and limbs are examined carefully. The hooves are examined for cracks, foot rot, evidence of founder, and other abnormalities. Extremely straight hocked (post-legged) bulls should be avoided. These abnormalities are noted on the BSE form.

Careful examination of the genital organs is just as critical as the semen examination itself. The sheath is examined carefully, often just prior to actual semen collection. Some polled bulls and most bulls with Brahman breeding have some natural prolapse of the sheath surrounding the penis. This should be noted if extreme, since injury to the sheath and subsequent infection can occur at pasture. The penis is palpated through the sheath for evidence of abscesses, hematoma (hemorrhage), and adhesions. Abscesses are circumscribed swellings that usually occur about halfway between the opening of the prepuce and the scrotum. Hematomas, or so-called broken penis, usually results in a larger swelling near the neck of the scrotum. Depending on severity and how long these conditions have existed, surgical treatment is possible but several weeks or even months is required before the bull is again a sound breeder.

The penis itself must be observed during the examination. This is usually done during the first part of the ejaculation process. Examinations where ejaculation occurs in the sheath result in contamination of the semen sample and are a poor indicator of breeding soundness. Failure to protrude the penis during the examination may be due to physical problems such as abscesses, hematomas, or adhesions.

Persistent frenulum occurs in young bulls, especially in the Shorthorns, Angus, and Santa Gertrudis breeds. This defect, which is the most common cause of the so-called deviated penis, can seriously affect entry into the vagina, but is easily corrected at the time of semen collection. Hair rings may surround the penis and have on occasion caused almost complete amputation without visible signs on the outside. This problem occurs most frequently in young bulls that ride each other a great deal. Warts are common and can lead to infection, pain, and reluctance to breed. Mature warts on a small stalk can be surgically removed, although large flat ones should be allowed to mature before removal. Such bulls should be checked at a future time. Adhesions, scars, and other serious defects of the penis may be found.

The scrotum and contents are carefully examined. The testicles should be symmetrical, nearly the same size, and freely movable in the scrotum. Small size or degeneration often affects one testicle only and is a serious finding. The consistency of the normal testicle is much like a firm rubber ball. Extremely hard testicles indicates infection (orchitis) and very soft ones indicate degeneration. Bulls that do

not have two normal testicles properly positioned in the scrotum should not be used for breeding. The epididymides, the structure that surrounds the testicles and transports semen to the accessory sex glands are carefully palpated. Defects of this structure seriously affect fertility.

The neck or upper part of the scrotum is carefully examined. Intestines will be found in the upper part of the scrotum if severe inguinal hernia is present. This is most common on the left side. Sometimes large fat deposits in the upper part of the scrotum can resemble inguinal hernia, but these can be differentiated by rectal examination and palpation of the internal inguinal rings.

Palpating the internal genital organs of the bull should be the last part of the physical examination. It allows for evaluation of the internal genital organs, removes fecal material from the rectum so the electric probe is more effective, and acts as a pre-stimulation prior to ejaculation. Several important finding may become apparent as a result of rectal examination. The presence of inguinal hernia may be detected. Another common finding is seminal vesiculitis, or infection of the seminal vesicles. This condition occurs commonly frequently in bulls held in confinement. When this condition is present, there is usually pus in the semen sample. Infertility is common. Such bulls can often be treated by rest, (turning out to pasture is preferable), treatment with antibiotics such as the tetracyclines in the feed for a long period of time, and reexamination in 30-60 days. Severe cases may not respond to treatment.

Semen Collection

Semen is collected by three methods:
1. Rectal massage
2. Artificial vagina
3. Electro-ejaculation

Rectal massage usually yields a sample that is less representative of a bull's semen quality than when taken by the other two techniques. Many bulls urinate during collection by this method and contaminate the sample. It is also difficult to examine the bulls penis when the sample is collected by this method.

Semen samples taken with an artificial vagina are very representative of the bull's semen quality, and this method of collection offers some evaluation of a bull's libido. A trained mount animal and sizeable working area is needed for this technique.

The electro-ejaculator has made collection of large numbers of bulls feasible. It is relative quick and can be done in a small area. The major disadvantages of this method are that the volume of ejaculate cannot be accurately measured, and the process is not representative of the ejaculation process, as is use of an artificial vagina. Rarely, a bull will not respond to use of an ejaculator. Contrary to some opinions, however, ejaculation of bulls with this instrument is safe and does not constitute an undue hazard to the bull. Injury is very rare when the instrument is used properly.

The probe of the ejaculator is inserted into the rectum and held by an assistant, who may also have to help the bull protrude the penis by pushing on the sigmoid flexure which is located just behind the scrotum. The veterinarian carefully examines the penis and then proceeds with collection. Erection and ejaculation is accomplished by careful pulsation with the electro-ejaculator. Proper technique is a matter of training and experience. The operator must be able to differentiate between pre-ejaculate fluid and semen. The latter is normally creamy and thicker than pre-ejaculate fluids, so collection technique is important.

Breeding Soundness Examination Score

Bulls that pass the physical examination on the BSE are scored on three criteria and rated

as Satisfactory, Questionable, or Unsatisfactory. The final rating system is:

Total Points on the BSE Examination

Total Points	Classification
60-100	Satisfactory Potential Breeder
30-59	Questionable Potential Breeder
0-29	Unsatisfactory Potential Breeder

The three criteria on which this scoring system and points assigned to each are:

Criteria for BSE Scoring System

Criteria	Points Assigned
Scrotal Circumference	40
Sperm Morphology	40
Motility	20
Total Points Possible	100

This scoring system has been determined by thousands of breeding soundness examinations and correlation with actual test mating of bulls to fertile heifers and cows. It has been shown that these three criteria correlate closely with fertility and in the proportion shown. This does not mean that a bull with large scrotal circumference, good sperm morphology, and high motility automatically passes a BSE. A bull with a high score but with an inguinal hernia or other serious physical defect can still fail a breeding soundness examination.

Scrotal Circumference

Large, round testicles correlate closely with fertility. Scrotal circumference is measured with a scrotal tape and recorded in centimeters. Scrotal circumference is measured by encircling the neck of the scrotum with one hand and pushing the testicles ventrally with enough force to remove wrinkles in the scrotal skin. The scrotal tape is positioned firmly but not tightly around the scrotum. The measurement is converted to a score which is adjusted for age. The correlation score is based on thousands of test matings.

Scrotal Circumference

Age (months)	Circumference (cm)		
<15	>34	30-34	<30
15-20	>36	31-36	<31
21-30	>38	32-38	<32
>30	>39	34-39	<34
Score	40	24	10

Concentration and Motility of Semen

Concentration of semen is not part of the official scoring system but should be considered by the practitioner. A very good sample should be creamy, white, opaque, and viscid, containing many tiny white flakes. Pus will cause the semen to appear dense, yellow, and almost clotted. White blood cells contained in pus will be easily detected when the semen sample is examined microscopically. Urine, which quickly kills sperm and would negatively affect the motility score, will give the semen a yellow color. Blood is also lethal to sperm, but is detected by microscopic examination.

Motility accounts for 20% of the BSE score and is an important indicator of fertility. Semen samples must be carefully protected against heat or cold shock between the time of collection and examination. Many veterinarians prefer to only do BSE on bulls in their own clinic so that such problems are easier to control. Water bath solutions set at the proper temperature are very important when conducting the BSE.

Motility is assessed based on gross motility and individual sperm motility. When evaluating gross motility, vigorous swirls and eddies, rapidly changing light fields, or the impression of a "blizzard" is an indication of good motility. Individual sperm are observed microscopically and evaluated for rapid linear movement,

which is desirable. Motility is scored as follows:

Motility Evaluation

Gross	Rapid swirling	Slow swirling	General Oscillation	Sporadic Oscillation
Individual	Rapid Linear	Moderate Linear	Slow Linear	Very Slow Linear
Score	20	12	10	3

Sperm Morphology

Sperm morphology or structure is also closely correlated with fertility. Bulls in natural service usually display decreased fertility if more than 35 or 40% of their sperm is abnormal. Morphology is checked by preparing a stained slide of the semen sample, randomly counting sperm cells under the microscope, and recording the number of normal and abnormal cells. Sperm cells are recorded as either normal, have a secondary defect, or a primary defect. Primary defects generally occur within the testicle during spermatogenesis and are considered more serious than secondary defects. Examples of primary defects are: abnormal head shapes, midpiece abnormalities, proximal protoplasmic droplets, and tightly coiled tails. Secondary abnormalities occur as the sperm travel through the duct system or during ejaculation. These include distle protoplasmic droplets, detached normal heads, and simple bent or curved tails. Sperm morphology is examined and recorded according to the following table:

Scoring Sperm Morphology

Primary Abnormalities	<10%	10-19	20-29	>29
Total Abnormalities	<25%	26-39	40-59	>59
Score for Morphology	40	24	10	3
Classification	Very Good	Good	Fair	Poor

Bulls with a total BSE score of 60 or greater are rated as satisfactory potential breeders and can be sold and/or used with judicious observation. Bulls with a BSE score between 30 and 59 are considered questionable potential breeders and should not be sold. Sometimes young bulls will improve their score with age, depending on the reason for the lower score. Rechecking in 30-60 days may be advisable. Bulls that score as unsatisfactory breeders may be rechecked, although the prognosis for becoming a satisfactory breeder is much lower than for those in the questionable category.

Sometimes, special tests are required. It may be necessary to collect and stain a smear from the prepuce to check for trichomoniasis, a venereal disease of cattle. Repeated cultures of the same material may be required for

vibriosis diagnosis. These two diseases are fairly common in mature bulls that have been previously used in other herds.

When doing breeding soundness examination on bulls for sale, tests for brucellosis, leptospirosis, and tuberculosis may be necessary. This depends on applicable state regulations and/or the desires of the buyer.

Bull Health Program

Bulls are susceptible to most of the same diseases and health problems as other classes of cattle. Vaccination of young bulls at six months of age and again as yearlings for IBR, BVD, PI-3, and the Clostridial group (blackleg and other causes of sudden death) are advisable. They should be treated for grubs and lice and wormed during the fall, and observed for health problems during the "off" season as well as during the breeding season. Bulls should have opportunity for exercise and not be allowed to become obese. During the summer, face and horn fly control should be practiced. Horn flies in particular concentrate in large numbers on bulls. They should be treated with an approved insecticide. Never use Dursban-44 on bulls, as it leads to a fatal and irreversible degeneration of the spinal cord.

Frostbite of the scrotum during extremely cold weather is, unfortunately, fairly common and leads to permanent sterility. Frost bite may not be grossly evident, as even slight freezing of the end of the scrotum may damage the tail of the epididymis, leading to permanent sterility. Providing deep, dry bedding during cold weather and a satisfactory windbreak will prevent most cases of scrotal frost bite.

Bulls should have a breeding soundness examination performed about 6-8 weeks prior to the breeding season, so that any problems found can be corrected prior to use. The feet should be trimmed at this time, if needed, and at any time of the year when excessive growth is evident.

Conclusion

The bull has been described as half of the herd. Catastrophic losses due to infertility are not uncommon. A professionally done, complete breeding soundness examination, careful observation during the breeding season, and good health management will prevent most problems of breeding bulls.

Reference

Elmore, R.G. Breeding Soundness Examinations of Domestic Male Animals. Veterinary Medicine, April-November, 1985.

20279

THE CORNHUSKER PRESS - HASTINGS, NE 68901

Society For Theriogenology
Association Bldg. 9th and Minnesota Hastings, Nebraska 68901

NCR PAPER - No Carbon Required.

Owner: Date: Case No.:

Date of previous exam.:
Case No. of previous exam.:
Classification:

Address

Bull:
Name
Birth Date:
Breed:
Reg. No. Tattoo Horn Brand Ear Tag Hide Brand Other

Remarks relative to breeding history, calf production, breeding efficiency of family, herd management, etc.

Classification: Interpretation of data resulting from this examination would indicate, to the best of my knowledge, that this bull is a:
Satisfactory potential breeder_____ Questionable potential breeder_____ Unsatisfactory breeder_____

Remarks: **Unless otherwise indicated below this bull has been examined only for physical soundness and quality of semen. No special diagnostic tests were made for possible venereal disease or other infection.**

Veterinarian

Member: Society for Theriogenology

BE SURE TO REMOVE BLANK TISSUE BEFORE FILLING OUT THIS SIDE.

CHARACTERISTICS	Ejaculates 1	2	3
Scrotal Circumference cm.			
Morphology % Primary Abnormalities			
% Secondary Abnormalities			
% Total Abnormalities			
Spheroids/ H.P. Field			
Non-germinal Cellular Material			
WBC RBC Epithelial Cells			
Scrotal Circumference Score			
Morphology Score			
Motility Score			
TOTAL SCORE			

CLASSIFICATION of SEMEN QUALITY
Check One (✓)
Satisfactory_____
Questionable_____
Unsatisfactory_____

COLLECTION METHOD
Check One (✓) EE._____
AV._____ Massage_____
Erection_____
Protrusion_____
Ejaculation_____

Indicate final classification on front of card. Be sure to remove blank before filling out other side.

PHYSICAL EXAMINATION - REMARKS General Condition Check One (✓) Good_____ Fair_____ Poor_____

Vesicular Glands
Inguinal Rings
Vasa Deferentia
Viscera and Omentum
Opthlalmic
Feet and Legs
Testes
Epididymes
Vasa Deferentia
Spermatic Cord
Penis
Prepuce
Other

CLASSIFICATION of PHYSICAL CONDITION
Check One (✓)
Satisfactory_____
Questionable_____
Unsatisfactory_____

OTHER TESTS IF USED
Libido
Mating Ability
Cytogenetic and Other Special Tests
Other

44.

INFORMATION
TABLES TO BE USED IN COMPUTING SCORES

Scoring Criteria		Ver. Good	Good	Fair	Poor
Scrotal Circum. by Age	12-14 mos.	> 34 cm	30-34	< 30	< 30
	15-20 mos.	> 36 cm	31-36	< 31	< 31
	21-30 mos.	> 38 cm	32-38	< 32	< 32
	over 31 mos.	> 39 cm	34-39	< 34	< 34
SCORE FOR SCROTAL CIRCUMFERENCE:		40	24	10	10
SEMEN MORPHOLOGY Primary Abnormalities		< 10	10-19	20-29	> 29
Total Abnormalities		< 25	26-39	40-59	> 59
SCORE FOR MORPHOLOGY		40	24	10	3

Gross Motility	Rapid Swirling	Slower Swirling	Generalized Oscillation	Sporadic Oscillation
Individual	Rapid Linear	Moderate Linear	Slow Linear To Erratic	Very Slow Erratic
SCORE FOR MOTILITY:	20	12	10	3

NebGuide

PUBLISHED BY COOPERATIVE EXTENSION SERVICE
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES,
UNIVERSITY OF NEBRASKA - LINCOLN

TEACHING RESEARCH EXTENSION

G80-536

Reproductive Tract Anatomy and Physiology of the Bull[1]

Gene H. Deutscher
District Extension Specialist (Livestock)

Good reproductive performance of a bull is necessary to obtain a high percent calf crop. A bull must be fertile and capable of servicing a large number of cows during a short breeding season for optimum production. Understanding the anatomy and physiology of the bull's reproductive tract is beneficial for proper management. A basic knowledge of the reproductive system will also help the producer to understand fertility examinations, reproductive problems and breeding impairments.

Anatomy and Physiology

The reproductive tract of the bull consists of the testicles and secondary sex organs which transport the spermatozoa from the testicle and eventually deposit them in the female reproductive tract. These organs are the *epididymis, vas deferens* and *penis,* and three accessory sex glands—the *seminal vesicles, prostate* and *Cowper's gland.* This basic anatomy is illustrated in *Figure 1.*

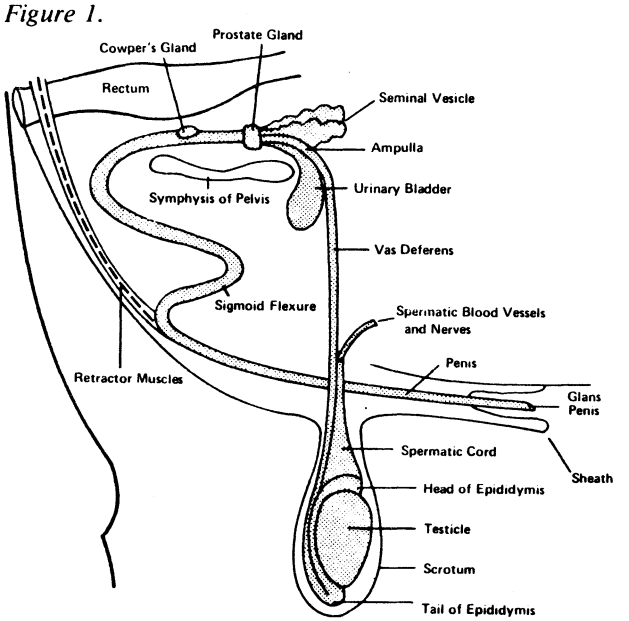


Figure 1. Diagrammatic drawing of the reproductive tract of the bull.

The testicle has two very vital functions: (1) producing the *spermatozoa,* and (2) producing the specific male hormone, *testosterone.* The testicles are located outside of the body cavity in the scrotum. This is essential for normal sperm formation which occurs only at a temperature several degrees below normal body temperature. However, very cold temperatures can also damage the testicle. The scrotum, therefore, helps to protect the testicle against both extremes of temperature. This is done by means of a temperature sensitive layer of muscle (cremaster muscle) located in the walls of the scrotum, which relaxes when hot and contracts when cold. Relaxation increases the relative length of the scrotum, thus moving the testicles away from body heat. In cold weather just the reverse happens—the scrotum shortens and the testicles are held close to the warm body.

One or both testicles occasionally fail to descend into the scrotum during embryological development, and are retained in the body cavity. Such males are referred to as *cryptorchids.* Since body heat can destroy sperm producing ability, no sperm are produced by the retained testicle. If one of the testicles descends into the scrotum, it will function normally and usually produces enough sperm so that the male will be of near normal fertility. However, since this condition appears to have a hereditary basis, such males should not be used for breeding. If both testicles are retained, the male will be sterile.

Hormone production is usually near normal in the cryptorchid testicle and the male develops and behaves like a normal male. If this retained testicle is not removed at the time of castration, the male will develop the secondary sex characters of an uncastrated male. This operation is not as simple, nor as safe, as removing testicles that are in the scrotum. Therefore, it is recommended to select against this trait by culling cryptorchid males.

[1] Adapted from Great Plains Beef Handbook Fact Sheet GPE-8450 by E. J. Turman and T. D. Rich, Oklahoma State University.

In addition to cryptorchidism, there are other circumstances which may cause sterility by raising the temperature of the testicle. These include excessive fat deposits in the scrotum; several days of very high fever; and exposing the males for extended periods to very high environmental temperatures. If the male was producing sperm prior to exposure to such conditions, and the period of exposure was not too prolonged, the resulting sterility is generally only temporary (6 to 10 weeks) and, if the conditions are corrected, normal fertility will eventually return.

The testicle contains many long, tiny, coiled tubes, the *seminiferous tubules,* within which the sperm are formed and mature. Scattered throughout the loose connective tissue surrounding the seminiferous tubules are many highly specialized cells, the *interstitial cells of Leydig,* that produce the male hormone.

There are many hundreds of individual seminiferous tubules in the testicle. These unite with one another until eventually some dozen tubules pass out of the testicle into the head of the epididymis.

The epididymis is a compact, flat, elongated structure closely attached to one side of the testicle. In it the dozen or so *vasa efferentia* from the testicle combine into a single tubule some 130 to 160 feet (40 to 49 m) in length, which is packed into the relatively short epididymis. This tubule eventually emerges from the tail of the epididymis as a single straight tubule (the *vas deferens)* and passes as part of the spermatic cord through the inguinal ring into the body cavity.

It requires 45 to 50 days for sperm to form in the seminiferous tubules and move through the epididymis where they mature for ejaculation. About one week of this time is spent in the epididymis, a period of time that appears to be necessary for the sperm cells to mature into fertile sperm. The sperm in the testicle are much more sensitive to damage from heat than are those that have already been formed and are stored in the epididymis. This may result in a slight delay between the time a male is exposed to some unfavorable condition and the time his fertility is reduced. However, this period of reduced fertility may then last for the 45 to 50 days required to produce a new sperm cell. This may explain why a male may settle females for a week or so after recovering from a high fever and then go through an infertile period of several weeks.

The epididymis is a single tube which serves as an outlet for all the sperm produced in the testicle and any blockage of this tube is a serious matter. Sometimes there is a temporary blockage due to swelling following an injury or infection *(epididymitis)* as shown in *Figure 2.* However, this swelling or infection occasionally results in the formation of scar tissue in the tubule, permanently blocking it and preventing the passage of sperm.

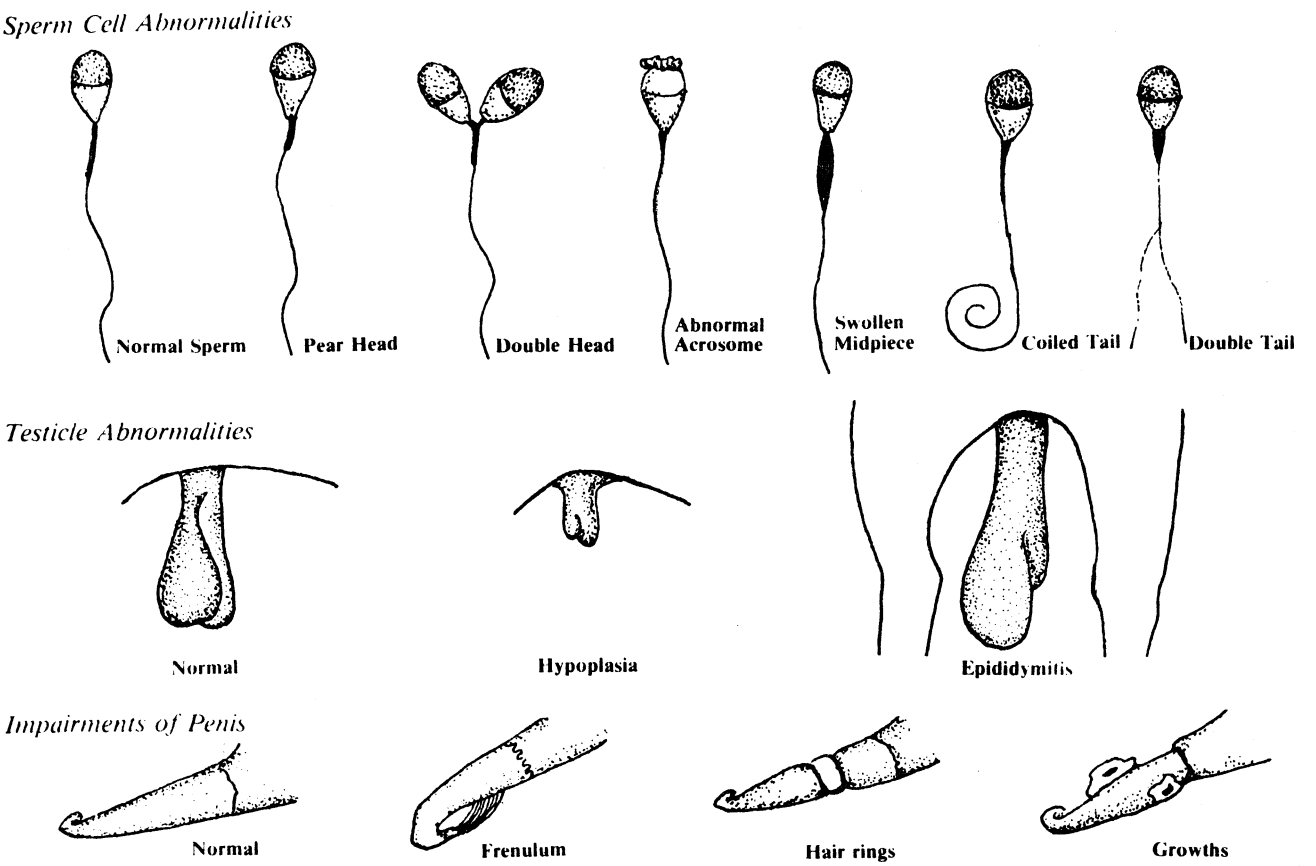


Figure 2. Diagrammatic sketches of some abnormalities and impairments of sperm cells, testicle and penis.

In addition to the vas deferens the spermatic cord includes the blood vessels and nerves supplying the testicle and the supporting muscles and the connective tissue. Males may be sterilized by an operation called a vasectomy in which the vas deferens are cut so that sperm cannot pass to the outside of the body. If only the vas deferens is cut, the testicle continues to function normally, producing both sperm and male hormone. However, if the blood vessels of the spermatic cord are cut or blocked, shutting off the blood supply, the testicle will stop functioning and waste away.

One of the weak spots of the male anatomy is the *inguinal ring,* the opening through which the spermatic cord passes into the body cavity. If it enlarges, usually as a result of an injury, a loop of the intestine can pass into the scrotum, resulting in a scrotal hernia. Since predisposition to injury at this point appears to have a hereditary basis, males with scrotal hernias should not be used for breeding even though they may be of normal fertility.

The two vas deferens eventually unite into a single tube (the *urethra)* which is the channel passing through the penis. The urethra serves as the common passage way for the excretory products of the two male tracts—semen of the reproductive tract and urine of the urinary tract.

Two of the accessory glands are found in the general region where the vas deferens unite to become the urethra. These glands produce the secretions that make up most of the liquid portion of the semen. In addition, the secretions activate the sperm to become motile.

The largest of these, and the one producing the largest fraction of the seminal fluid, is the *seminal vesicles.* They consist of two lobes about 4 to 5 inches (10 to 12 cm) long, each connected to the urethra by a duct. Another accessory gland in this region is the *prostate* gland, which is located at the neck of the urinary bladder where it empties into the urethra. The prostate is poorly developed in the bull and does not produce a very large volume of secretion.

The third accessory gland, the *Cowper's glands,* are small, firm glands located on either side of the urethra. It is believed that one of the chief functions of their secretion is to cleanse the urethra of any residue of urine which might be harmful to spermatozoa. The clear secretion that often drips from the penis during sexual excitement prior to service is largely produced by these glands.

One of the accessory glands may occasionally become infected, resulting in semen samples that are yellow and cloudy and which contain many pus cells. It is not uncommon in bulls for the seminal vesicles to be so affected *(seminal vesiculitis).*

The sigmoid flexure is an anatomical structure that provides the means by which the penis is held inside the body and sheath except during time of service. Strong retractor muscles serve to hold the penis in the "S" shaped configuration. Occasionally these muscles are too weak to function properly and a portion of the penis and sheath lining protrude at all times. This exposes the male to the danger of mechanical injury, particularly in rough, brushy country, or on ranges where there is considerable cactus and prickly pear.

The penis is the organ of insemination. In all domestic animals it consists of two cylindrical bodies called the *corpora cavernose penis.* The spaces of the corpora cavernosa become filled with blood during sexual excitement, resulting in erection of the organ. The end of the penis is the glans penis. The glans penis is richly supplied with nerves and is the source of the sensations associated with copulation. Impairments of the glans penis may exist *(Figure 2)* and should be corrected during a fertility exam.

Semen

Semen consists of the spermatozoa and a liquid composed largely of the secretions of the accessory glands. The volume of semen and the number of sperm ejaculated by different bulls varies considerably. However, most bulls will ejaculate 3 to 5cc of semen containing about 1 billion sperm per cc, or 3 to 5 billion sperm per ejaculate.

Once sexual maturity is reached in farm animals, sperm production is continuous throughout the remainder of their reproductive life. During periods of sexual rest old sperm in the epididymis die, degenerate and are absorbed. For this reason, the first sample collected after a long period of sexual inactivity may appear to have a high percentage of dead and abnormal sperm. Therefore, semen evaluation of a bull should not be made on one collection alone.

Semen evaluation is being practiced more and more. However, it should be realized that its primary value lies in detecting males that have very definite semen deficiencies such as no sperm, a very low number of sperm cells, poor motility, large number of abnormal sperm *(Figure 2),* a large percentage of dead sperm, and the presence of large amounts of pus. Males producing semen of this sort will usually be sterile or of low fertility. However, there is a wide range of semen quality in males of normal fertility, and it is difficult to predict the level of fertility in a male that does not have grossly deficient semen.

Hormonal Regulation of the Male Reproductive System

The normal functioning of the male in reproduction is largely controlled by hormones. Produced by a specialized gland called an endocrine gland, a hormone is a specific chemical substance which passes into the body fluids (blood and lymph) and is transported to various parts of the body where it produces some specific effect.

The testicle functions as an endocrine gland because of the production of the male hormone, *testosterone,* by

the interstitial cells. Testosterone has several major effects:

1. It is largely responsible for the development and maintenance of the male reproductive tract.
2. It causes the development and maintenance of the secondary sex characteristics associated with "masculinity," such as the crest and heavily muscled shoulders of the bull, the spur and comb of the rooster, the tusks of the boar, and the growth of the beard and change of voice in man.
3. It is a major factor in normal sex drive and behavior of the male.
4. It increases muscular and skeletal growth.
5. It is essential for normal sperm formation.

The testicle is, in turn, under the influence of hormones produced by other glands in the body. The primary hormones regulating the testicle are the *gonadotropic hormones* produced by the anterior lobe of the pituitary gland. The pituitary gland is a small gland located under the brain at the base of the skull. The pituitary hormones regulating reproduction in both the male and the female (by stimulating the testes or ovaries) are called gonadotropic hormones.

Not only is the hormonal production by the testicle regulated by hormones released by the anterior pituitary but the reverse is also true. The level of testosterone in the blood regulates the secretion of the gonadotropic hormones by means of a feedback mechanism.

Purified preparations of gonadotropic hormones or preparations with a similar physiological action are available for use by veterinarians. They can be useful in treating some cases of reproductive failures, *but only if the problem is caused by a deficiency of that hormone.*

Because of the feedback mechanism controlling hormone release, normal functioning depends on a proper balance of the hormones and too much can be just as undesirable as too little. The use of hormone therapy should not be routinely carried out, and should be done only by qualified persons, with the expectation that they may not be of benefit.

EXTENSION WORK IN "AGRICULTURE, HOME ECONOMICS AND SUBJECTS RELATING THERETO,"
THE COOPERATIVE EXTENSION SERVICE, INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES,
UNIVERSITY OF NEBRASKA-LINCOLN, COOPERATING WITH THE COUNTIES AND THE U.S. DEPARTMENT OF AGRICULTURE
LEO E. LUCAS, DIRECTOR

File Under: BEEF
B-9, Breeding & Reproduction
Issued December 1980, 15,000

NebGuide

PUBLISHED BY COOPERATIVE EXTENSION SERVICE
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA - LINCOLN

G88-895

Pelvic Measurements for Reducing Calving Difficulty

Gene H. Deutscher, Extension Beef Specialist

This publication discusses the importance and use of pelvic measurements in heifers and bulls to assist in reducing the incidence and severity of calving difficulty.

Calving difficulty results in a major economic loss to beef producers. This loss is estimated at $25 million annually in Nebraska.

Calving difficulty increases calf death loss, cow mortality, labor and veterinary costs; it delays the return of cows to estrus and reduces conception rates. It also lowers calf weaning weight and market value, which results from breeding practices of young heifers and cows due to bull selection for reducing calving difficulty.

Studies show calf losses of 4 percent within 24 hours of birth for calves born unassisted, compared to 16 percent for calves requiring assistance. Montana research indicates 57 percent of all calf losses were due to dystocia (calving difficulty).

Calving difficulty is becoming a greater concern for beef producers because of increased emphasis on rapid growth rates, heavier weaning weights and improving cow efficiency. As producers select bulls for more growth, larger calves at birth and more calving difficulty can be expected.

Importance of Pelvic Measurements

Many factors are associated with calving difficulty, including: small first calf heifer; large fetus; male fetus; small pelvic size of dam; long gestation; heavy birth weight sire; dam too thin or too fat, and abnormal fetal presentation at calving. Research indicates the major cause of dystocia is a disproportion between the calf size at birth (birth weight) and the cow's birth canal (pelvic area).

Figure 2 shows the relationship of calf birth weight and cow pelvic area to the incidence of dystocia in two-year-old heifers in a study in Montana. An Oklahoma study showed calves born unassisted were seven pounds

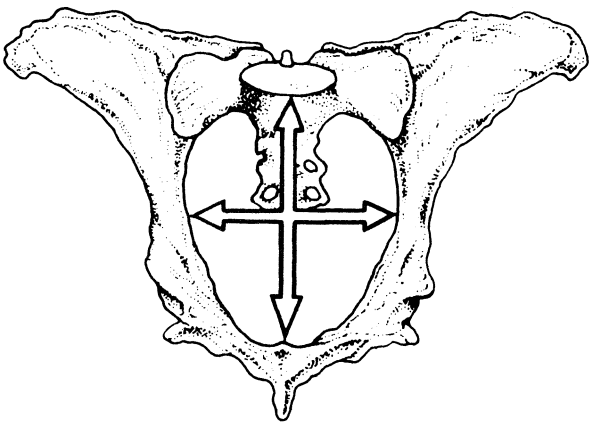


Figure 1. Vertical and horizontal measurements are obtained to determine pelvic area.

lighter at birth, compared to those born with assistance. Heifers with small pelvic areas experienced an 85 percent difficulty rate compared to 31 percent difficulty for heifers with large pelvic areas. South Dakota research showed heifers with below average pelvic areas (less than 140 cm^2) had twice the incidence of dystocia as those with above average pelvic areas (49 percent versus 24 percent).

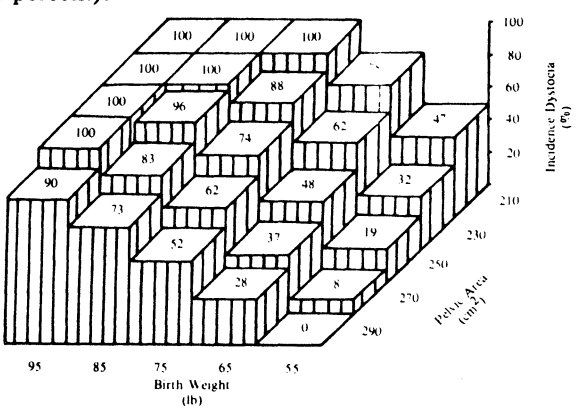


Figure 2. Relationship of heifer pelvic area, calf birth weight and incidence of dystocia in 600 two-year-old heifers. (Bellows 1983)

Large frame cows tend to have large pelvic areas, but also have proportionately heavier calves at birth, which offsets any advantage of less calving difficulty. Selecting on cow size alone seems ineffective.

A low relationship has been found between a heifer's pelvic area and the birth weight of her calf. Selecting heifers with a large pelvic size, rather than by body weight alone, should be advantageous and should not increase calf birth weight.

In general, heifer weight and age have a positive relationship to pelvic area, but weight is not always a good indicator. Two heifers of equal weights can have considerably different pelvic areas.

External dimensions such as width of hooks and length of rump are not good indicators of pelvic area or calving difficulty. Neither are slope of rump and pelvis structure. Research shows that pelvic area has the most influence on dystocia of all cow measurements evaluated.

The best time for identifying heifers with a high potential for dystocia is before breeding. Pelvic area has been found to be the most reliable yearling trait indicating potential difficulty. Studies show that pelvic area growth is linear from nine to 24 months in heifers calving at two years of age. Obtaining pelvic measurements on yearling heifers and culling those with small pelvic areas can reduce dystocia.

Pelvic Area and Calf Birth Weight Relationship

Research shows that calf birth weight in relation to the cow's pelvic area determines the degree of calving difficulty. Using research data from South Dakota and Nebraska, a pelvic area and calf birth weight ratio (factor) has been developed. The ratio was derived by dividing the heifer's pelvic area by the calf birth weight she delivered. *Figure 3* shows that as the ratios decreased, the degree of calving difficulty increased.

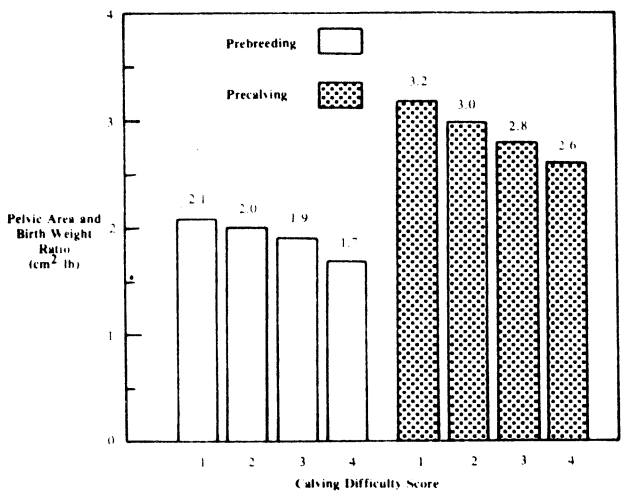


Figure 3. Pelvic area and calf birth weight ratios prebreeding and precalving in relation to calving difficulty scores. (Scores were 1 - no assistance, 2 - slight assistance, 3 - moderate assistance, 4 - major assistance or C-section.) (Deutscher 1988)

Heifers with ratios of 2.1 or greater before breeding had little or no calving difficulty, while heifers with ratios of 1.9 or less required substantial assistance using a calf puller. These ratios are useful in predicting which heifers may require assistance delivering a certain size calf.

Pelvic measurements can be obtained on a heifer before breeding and the pelvic area divided by a ratio (factor) of 2.1 to estimate the calf birth weight the heifer can deliver as a two-year-old without having substantial difficulty. For example *(Table 1)*, a 600 lb yearling heifer with a pelvic area of 140 cm^2 should be able to deliver, as a two-year-old, a 67 lb calf without difficulty (140 ÷ 2.1 = 67). Heifers with larger pelvic areas can deliver larger birth weight calves. However, a heifer with a smaller pelvic area such as 120 cm^2 probably would require a Caesarean to deliver a 75 lb calf (120 ÷ 75 = 1.6 ratio) as shown in *Figure 3*.

Pelvic measurements can be obtained at the time of pregnancy exam but the ratio (factor) of 2.7 should be used to estimate calf birth weight of 18 to 19 month old, 800 lb heifers *(Table 1)*. If heifers vary considerably in weight at the time of obtaining the measurements, different ratios should be used. *Table 2* shows the ratios (factors) to be used for various weights and ages of heifers. These ratios appear to be good indicators of dystocia, with an accuracy of about 80 percent.

Using Heifer Pelvic Measurements

If pelvic measurements are obtained before breeding, potential problem heifers with a small pelvic size can be culled from the herd. Heifers with a large pelvic area can be mated to bulls for larger calves. Since the larger, heavier heifers do not always have the largest pelvic area, all heifers should be measured and mated according to pelvic size.

Research indicates that a normal 600 pound yearling heifer should have a pelvis at least 11 cm wide and 12 cm high to deliver a 63 pound calf. Heifers with a smaller width or height dimension should be considered for culling.

Average pelvic area growth has been calculated at 0.27 cm^2/day from yearling to two years of age in heifers, and continues at a slower rate until the cow reaches maturity. Some producers may wish to adjust pelvic areas of heifers to a standard 365 days of age. This can be accomplished by using the growth factor of 0.27 cm^2/day.

However, in a group of puberal heifers, no adjustment is warranted, since all heifers theoretically could become pregnant early in the breeding season and have about the same number of days to develop before calving. Heifers with small pelvic areas as yearlings usually have the smallest pelvic areas at calving.

Pelvic measurements should be taken two to three weeks before the breeding season and can be incorporated into a total heifer management program. This pro-

Table 1. Using Pelvic Measurements to Estimate Deliverable Calf Size (Birth Weight)

Time of Measurement	*Heifer Age, mo.*	*Heifer Wt, lb*	*Pelvic Area, cm^2*	*Pelvic Area/ Birth Wt Ratio*	*Estimated Calf Birth Wt, lb*
Before breeding	12-13	600	140	2.1	67
			160	2.1	76
			180	2.1	86
Pregnancy exam	18-19	800	180	2.7	67
			200	2.7	74
			220	2.7	82

Table 2. Pelvic Area/Calf Birth Weight Ratios for Various Heifer Weights and Ages to Estimate Deliverable Calf Birth Weight

Heifer	*Age at measurement, months*			
Weight, lb	*8-9*	*12-13*	*18-19*	*22-23*
500	1.7	2.0	---	---
600	1.8	2.1	---	---
700	1.9	2.2	2.6	---
800	---	2.3	2.7	3.1
900	---	2.4	2.8	3.2
1000	---	2.5	2.9	3.3
1100	---	---	---	3.4

gram involves selecting heifers for breeding by size and type, obtaining pelvic measurements, palpating for ovarian development (puberty), and vaccinating for reproductive diseases, all during one processing through the chute.

Such a program helps ensure that a high percentage of the heifers are cycling and could become pregnant early in the breeding season, and should result in reduced incidences of dystocia. The program also would aid in an estrous synchronization and AI program by determining the percentage of heifers cycling, and assist in sire selection for reducing difficulty.

If heifers are measured at the time of pregnancy examination, small problem heifers could be culled, or aborted and sold as feeders. Bred heifers predicted to have a potential problem also could be marked for close observation at calving.

Heritability of Pelvic Area

Research estimates the heritability of pelvic area to range from 36 percent to 68 percent, with an average of 55 percent. These values indicate that pelvic area is a highly heritable trait and may be higher than the 45 percent heritability of calf birth weight. This means both traits will respond rapidly to selection. Birth weight does not appear to be correlated with pelvic area, so selection for pelvic size should not give a corresponding increase in birth weight. By selecting both bulls and heifers for pelvic size, a herd of cows with large pelvic areas could be developed.

Using Bull Pelvic Measurements

Pelvic size can be transmitted readily from the sire to the resulting progeny. In a Colorado study, a 0.60 genetic correlation was found between male and female pelvic areas, indicating selection for large pelvic size in bulls should result in increased pelvic size of daughter offspring.

Nebraska research on 915 yearling bulls indicated only small differences in average pelvic size among breeds, but a large variation existed among bulls within a breed. For example, two yearling Simmental bulls of similar age and weight had pelvic areas that differed by 60 cm^2 (160 vs 220 cm^2). Bulls of some blood lines appear to have larger pelvic areas than others.

Pelvic areas of bulls are smaller than heifers of the same weight and age. Yearling bulls weighing 900 to 1,100 pounds average about 150 to 170 cm^2 in pelvic area, which is similar to yearling heifers weighing 650 to 700 pounds.

Age and weight of bulls influence pelvic area. Estimates of pelvic growth rates have been 0.31 cm^2/day of age and 0.09 cm^2/pound of body weight in bulls ranging from 10 to 15 months old and 700 to 1,400 pounds. These values can be used to adjust a set of bulls to a given standard, but ***both*** age and weight adjustments ***should not*** be used on the same bull.

Pelvic areas should be adjusted to an average weight or age of bulls in the group so comparisons on genetic potential can be made. For example, if the average

weight of a group of bulls is 1,000 pounds, then the adjusted pelvic area (PA) of a bull is: Adj. PA = actual PA + .09 x (1,000 minus actual weight).

Seedstock producers are beginning to report pelvic area of bulls along with other reproduction and performance traits. This information allows buyers to select bulls with various traits important to their herd, including pelvic area.

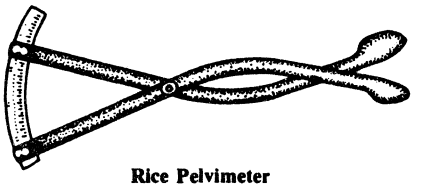
The best time to measure bulls is when they are yearlings, or at the end of their performance feeding test. The measurements can be obtained by a veterinarian in combination with the breeding soundness exam (fertility evaluation).

How to Measure Pelvic Area

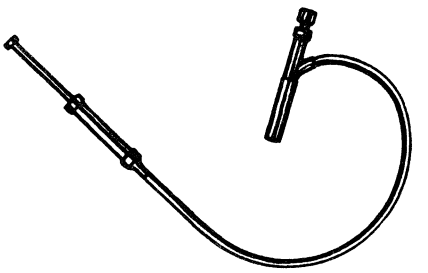
Pelvic measurements can be obtained with either of two instruments *(Figure 4)*. The Rice Pelvimeter is a metal inside-caliper-type instrument (Lane Manufacturing, 2075 So. Balentia St., Unit C, Denver, Colorado 80231) available for about $100. The Bovine Pelvic Meter (Jorgensen Labs, Inc., 2198 West 15th St., Loveland, Colorado 80538) is a hydraulic-type meter with a cylinder connected to a recorder by a flexible tubing. This meter costs about $275. Instructions for operating each of the instruments should be read and followed. Each instrument is designed to be placed in the rectum of the animal and the pelvic measurements are read on a scale outside the animal.

Measurements may be obtained by a veterinarian or experienced producer; a thorough understanding of the birth canal, pelvic structure and reproductive tract is needed. Practice and experience are necessary before accurate measurements can be obtained. Veterinarians in Nebraska are providing the measurement service for a nominal fee ($1.25 to $3 per animal, depending on size of group).

The general procedure is to restrain the animal in a chute with light squeeze. A comfortable, normal standing position is best. Feces should be removed from the rectum and the instrument carefully carried into the rectum with the hand. Use of undue force should be avoided during the procedure, since tissues can be torn or injured. Proceed forward with instrument to the pelvic inlet.



Rice Pelvimeter



Krautmann - Litton Bovine Pelvic Meter

Figure 4. Instruments to measure pelvic area in cattle.

Obtain the width of the pelvic inlet at its *widest* point, between the right and left shafts of the ilium (*Figure 1*, see page 1). This is the horizontal diameter of the pelvis. Then obtain the height of the pelvic inlet, between the dorsal pubic tubercle on the floor of the pelvis and the sacrum (spinal column) on the top *(Figure 1)*. Be sure to not slip off the pubic tubercle ventrad or miss the spinal column dorsad. This measurement should be the ***smallest*** dimension between these points and is the vertical diameter of the pelvis. The two measurements are read in centimeters and multiplied together to give the pelvic area in square centimeters.

Conclusion

The relationship of calf birth weight to heifer pelvic area is the major factor influencing the degree of dystocia. Heifers can be selected for large pelvic area to reduce the incidence of dystocia. Pelvic area is highly heritable so selecting breeding bulls with large pelvic areas can increase pelvic size of heifer offspring.

File under: BEEF
B-15, Breeding & Reproduction
Issued December 1988, 10,000

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture
Leo E. Lucas, Director of Cooperative Extension Service, University of Nebraska, Institute of Agriculture and Natural Resources.

MANAGEMENT OF YEARLING BULLS

Jim Gosey
Extension Beef Specialist
University of Nebraska, Lincoln

Most yearling bulls can be used effectively if they are critically selected, properly developed and carefully managed.

Fertility

It is important that yearling bulls be subjected to a Breeding Soundness Examination (BSE) in order to screen out bulls which would be high risk bulls in the breeding pasture. The BSE is a combination of a semen test, scrotal circumference measurement and physical examination of the reproductive tract.

The importance of producing viable semen in ample quantities is obvious, but semen evaluations of yearling bulls (11 to 15 months of age) can be misinterpreted. Failure to produce good semen at the first collection of a yearling bull should not be considered as damming. Such young bulls should be re-checked after a few days rest (or weeks if they are less than 13 months old) and often will produce acceptable semen. Normal extension of the penis (free of adhesions) and absence of pus in the ejaculate are positive, meaningful observations which by themselves, are sufficient reasons to semen check young bulls.

A minimum scrotal circumference for bulls should be established. Scrotal circumference is easily measured and is an excellent indicator trait since a significant, positive correlation exists between scrotal circumference and both volume and percent normal sperm cells. Further, research has indicated a strong genetic correlation (70%) between scrotal circumference in bulls and the fertility (as measured by earliness of puberty) of his daughters. Bulls measured at one year of age should have a scrotal circumference of at least 32 cm. and preferably 34 cm.

Sex drive (libido) is also a vital part of bull fertility and has little or no association with other fertility traits, such as semen quality or scrotal circumference. Libido testing of yearling bulls in research stations has revealed sizable differences in libido test scores of bulls which were later verified in terms of significant differences in actual conception rate. While libido testing is still in the experimental stage, it does look promising and may soon be a useful part of some seedstock breeders bull evaluation programs. It would be advisable to expose yearling bulls to a few cycling females prior to turning them in with the cow herd. Shy breeders, fighters, bulls that form a bond with one particular cow ignoring others in heat and bulls which have poor mounting orientation will sire few calves and thus be quite costly.

Yearling Bull Development

New bulls should be acquired at least 60 and preferably 90 days prior to the breeding season. This allows ample time for the new bulls to adjust to the feed and climate of the area. This time also allows bulls that will be working together to become familiar with each other and to develop a social structure.

Perhaps the single most critical factor for proper bull development is exercise. Physical fitness is not acquired overnight, but requires several weeks of conditioning. Bulls are by nature very active and become more so as the weather warms up prior to the breeding season. In designing bull facilities, it is a good idea to locate supplemental feeding areas and water as far apart as possible. Bulls that are physically fit when they are turned out will breed more cows because they will retain a high level of libido longer in the breeding season and they will stay sound longer as well. Exercise prior to the breeding season will also reduce injuries from fighting and riding during that time.

Nutrition prior to turn-out should be at a relatively high level for proper development of young bulls. Young bulls will usually lose weight early in the breeding season so they need to have an energy reserve when they are turned out. Perhaps the best way to describe the ideal condition is bloomy but not fat.

Most yearlings will weigh 1000 to 1100 pounds prior to the breeding season and gain about 2.0 pounds per day. This will require about 30 pounds of dry feed per day. Adequate energy should be provided by a ration that is 80% roughage (grass, hay or silage) and 20% concentrate. Depending upon the conditon of the bulls, this means 6 to 10 pounds of grain per head per day and free choice roughage. At this age the bulls will need to have 12% total protein in their diet. Depending upon the kind and quality of the roughage and the grain being fed, this may require a protein supplement.

Another problem sometimes encountered with yearling bulls is that of over-conditioning on newly acquired bulls that have been fitted for a show or sale. The let-down period should consist of ample exercise and gradually decreasing amounts of a ration not too dissimilar to the one to which the bulls have been accustomed.

Yearling Bull Management

Each year we see more bulls being used as yearlings. This is an excellent way to get an additional year of use from bulls reducing the per cow bull depreciation cost. However, there are several management tips that will make the success of yearling bulls much higher. Run yearling bulls only with other yearling bulls on a set of females. Yearlings who run with older bulls may be physically abused to the point that they will settle very few cows.

Reduce the bull to cow ratio to about 50% of that maintained with older bulls. If you run one mature bull to each 30 cows, 15 cows will be plenty for each yearling bull. Some producers have successfully rotated yearling bulls in and out of the breeding pasture at approximately 2 week intervals. This "rest and work" rotation requires more management but is very beneficial to maximizing the use of yearling bulls.

Yearlings should be left with the cow herd for 60 days or less. Beyond that time their condition will decline and may have long range effects upon their growth. After their removal from the cow herd the yearlings should continue to be kept separate from the older bulls at least through their second winter. They should be placed on the best available feed and should receive regular supplementation until the next breeding season. Remember, these young bulls are still growing rapidly, in addition to replacing all the condition they lost in the breeding pasture. Extra care and feed of yearling bulls after the breeding season will result in more attractive mature bulls with a much higher salvage value.

SUMMARY

The beef industry is definitely shifting to greater use of yearling bulls. Yearling bulls, on the average, will not breed quite as many cows as 2 year olds and do require a higher level of management during and after their first breeding season, however, the advantages in favor of yearlings outweigh the disadvantages: 1) a good selection of yearlings is available, 2) shorter generation interval with yearlings means superior genetics gets into commercial herds sooner, 3) economics, more and more seedstock breeders are finding 2 year olds to be an expensive item, 4) research and experience with using yearling bulls has disproved many of the criticisms associated with their use. Yearling bulls can be used successfully in almost any situation, provided common sense and proper management are practiced.

ESTIMATED ANNUAL COST OF KEEPING A BULL - 1988

	Quantity	Price	Farming Area[1] Cost	Ranching Area[2] Cost
Feed Costs				
Hay (alfalfa stacked)	1.50 tons	$ 50.00	$ 75.00	
Hay (prairie stacked)	1.50 tons	45.00		$ 67.50
Summer pasture	6.25 AUMs	12.00	75.00	
	6.25 AUMs	11.50		71.88
Stalk pasture	90.00 days	0.25	22.50	22.50
*Protein	1.50 cwt	11.00		16.50
*Salt and mineral	80.00 lbs	0.12	9.60	9.60
	Total Feed Costs		182.10	187.98
Other Cash Costs				
*Veterinary and medicine			13.75	13.75
*Cash costs on bldgs & equip			4.00	3.00
*Miscellaneous cash costs			7.25	7.25
**Int on cash costs (.5yr)	$ 34.60	0.12	2.08	
	$ 50.10	0.12		3.01
	Total Other Cash Costs		27.08	27.01
Labor	10.00 hrs	5.50	55.00	
	7.50 hrs	5.50		41.25
	Total Labor Costs		55.00	41.25
Fixed Costs				
Int on ave value of animal	$ 1150.00	0.12	138.00	138.00
Death loss on ave value	$ 1150.00	0.005	5.75	5.75
Depreciation (3 yrs)	$ 900.00		300.00	
(4 yrs)	$ 900.00			225.00
Fixed costs on bldgs & equip			14.00	6.00
	Total Fixed Costs		457.75	374.75
	Total Costs except Overhead & Mgt.		721.93	630.98
Overhead and Management				
Overhead	$ 34.60	0.05	1.73	
	$ 50.10	0.05		2.51
Management			11.00	11.00
	TOTAL COSTS		$ 734.66	$ 644.49
Total Cost Per Cow Per Year				
	30.00 cows		$ 24.49	
	25.00 cows			$ 25.78

[1]Bull kept for 3 years
[2]Bull kept for 4 years
*Items charged interest**

1989 NEBRASKA BULL SELECTION CLINICS

NAME _____

RANCH/FARM NAME _____

MAILING ADDRESS _____

CITY/TOWN _____ STATE _____ ZIP CODE _____

YES, PLEASE SEND ME A COPY OF THE SIRE SUMMARY FOR THE FOLLOWING BREEDS: (CIRCLE THE BREEDS FOR WHICH YOU WANT A SIRE SUMMARY)

ANGUS
BRANGUS
CHAROLAIS
GELBVIEH
HEREFORD
LIMOUSIN
POLLED HEREFORD
RED ANGUS
SALERS
SHORTHORN
SIMMENTAL
SOUTH DEVON
TARENTAISE

COMPLETE THE ABOVE INFO , TEAR OUT AND GIVE TO JIM GOSEY AT THE CLINIC, or

send later to : Jim Gosey, 204 Animal Science Dept., University of Nebraska, Lincoln, Nebraska 68583.

or, Phone your order to: Jim Gosey at 402-472-6417