

Beef Sire Selection for Cattle Genetic Improvement Program

(Updated February 9, 2007)

Introduction

The overall goal of the beef operation should be to increase net income. Net income is a balance between how much is spent on the operation and how much income the operation generates. Therefore, beef producers need to focus on increasing income while minimizing additional cost or reduce cost while trying to maintain income. Although this practice pertains to the entire beef operation, this program is to assist in selecting a bull that helps achieve this goal.

Two practices are available to improve the genetics of commercial beef operations: crossbreeding and individual bull selection. Crossbreeding has a major economic impact on your herd and should be practiced by commercial cattlemen (additional information is available in ASC-168, available at your county Extension office); however, this program does not require crossbreeding.

When looking for a bull to purchase for your operation it is important to realize that as you make progress to improve one trait you often lose ground in another trait. For example, as we select for increased growth, which has a positive impact on income, we usually inadvertently increase the mature size and maintenance costs of our cows through retaining replacements. Finding the balance between the productivity level of the cow (growth and milk) and the required energy to maintain her is very difficult and, if not done properly, will likely result in decreased reproduction. Research has shown that cow efficiency is dependent on the level of nutrition that they receive. Larger high-producing cows are the most efficient in very lush, high nutritional environments (Average Kentucky forages would not support this level of productivity) and smaller low-producing cows are the most efficient in limited nutritional situations. Under optimum nutrition there are very little differences between the breed types. Before you buy a bull it is important to consider what you want to produce and what resources (primarily nutrition) you have available.

Bull Purchasing

When purchasing a bull there are four primary characteristics that should be assessed: reproductive soundness; structural soundness; visual evaluation; and performance characteristics.

Reproductive Soundness – For a bull to have any value to a beef producer he must be reproductively sound.

The best means to determine the reproductive soundness of a bull is through a breeding soundness exam. If a bull passes this exam he should have the physical capability to breed and settle cows. This exam does not measure desire and bulls should be observed for their interest in females in heat. ***To receive cost-share money bulls must pass a breeding soundness exam.***

Structural Soundness – To be an efficient breeder a bull must be structurally sound. This means that he should move without pain or discomfort and should have appropriate angles at weight bearing joints.

There are no requirements for structural soundness; however, producers should evaluate bulls for soundness to avoid problems with breeding and future problems in replacement females.

Visual Evaluation – Many traits that are important to beef producers can only be evaluated through visual observation. These include, but are not limited to: disposition, horned/polled, color, muscling, body capacity, structure, sheath, and testicular development. ***There are no requirements for visual appraisal; however, producers are encouraged to carefully evaluate bulls for visual traits that are of economic or functional importance to them.***

Performance Characteristics – The primary reason for purchasing a bull is the expected performance of his calves. If replacement females will be retained then this decision should not be short sided, because the impact will be long lasting. Breeds differ on their level of productivity; therefore, the first decision will be on breed type. Once a breed is determined, selection between bulls for performance should be based on the Expected Progeny Differences (EPDs), whenever possible (For more information on EPDs please see ASC-141). There is no such thing as the “Best Bull”; each individual beef producer must make that determination based on what they want to get from the bull. ***Guidelines have been developed for six specific bull types. Producers must select what type of bull they will purchase (2 choices can be made) on their application then purchase a bull that meets the requirements for that bull type.***

Conclusions

Crossbreeding and bull selection have very important long-term economical impact on your herd. Selecting the right bull for your operation is a decision that includes setting production goals, analyzing your resources and management, and then locating the bull that best fits your situation. If done properly this process will take time and effort on your part, but the rewards can be significant.

How to determine if a bull qualifies for a category

1. All categories require that the bull meet a minimum Calving Ease or maximum Birth Weight EPD. If the breed you are using computes Calving Ease EPDs then that is the EPD that must be used. The bulls EPD must be equal to or be greater than the value listed for that category. If the breed does not compute Calving Ease EPDs then Birth Weight EPDs will be used. The breeds that use Birth Weight have parentheses around their values. The bulls Birth Weight EPD must be equal to or less than this value.
2. All categories have a requirement for growth, however, three have minimum values, one is a maximum value and for the other two there is an upper and lower limit. For Heifer Acceptable, Terminal Sire and High Productivity categories the bull's Weaning Weight **OR** Yearling Weight EPD must be equal to or greater than the value listed. For the Low Maintenance category the bull's Yearling Weight must be equal to or less than the value listed. For the Balanced Trait category the bull's Weaning Weight **OR** Yearling Weight EPD must be equal to or in between the two values listed. For the Carcass Merit category the bulls Carcass Weight EPD must be equal to or in between the two values listed. In this category if the breed does not compute Carcass Weight EPDs then Yearling Weight EPDs are used and this is indicated by the values being in parentheses.
3. There are requirements for milking ability in three of the categories. Balanced Trait bulls must have an EPD that is equal to or in between the two values listed. For the Low Maintenance Category the bull's EPD must be equal to or less than the value listed. High Productivity bulls must have a value that is equal to or greater than the EPD listed in the guidelines. The other three categories have no requirement for milk.
4. Carcass Merit bulls must also meet minimum standards carcass characteristics; one pertaining to improved Quality Grade and the other to improved Yield Grade. For improved Quality Grade the bull's EPD for Marbling or Intra-Muscular Fat (IMF) must be equal to or greater than the value listed (For Angus both Marbling and IMF values are listed and the bull must meet one or the other). For improved Yield Grade the bulls EPD for Yield Grade (lower values means greater red meat yield) must be equal to or less than the value listed. If the breed computes % Retail Product instead of Yield Grade EPDs then the bull's EPD must be equal to or greater than the value listed (For Angus either the Ultrasound %RP or the Carcass %RP may be used). If the breed does not compute Yield Grade or % Retail Product then the bull's EPD for Rib Eye Area (REA) must be equal to or greater than the value listed **AND** his EPD for Fat must be equal to or less than the value listed. Breeds that do not compute carcass EPDs do not qualify under this category.

For more information there is a video available at your county Extension office or contact your county agent for Agriculture and Natural Resources or Darrh Bullock, University of Kentucky Beef Extension Specialist (859-257-7514 or dbullock@uky.edu).

Heifer Acceptable Bulls

Breed	Calving Ease or (BW) ¹	Growth (either) ²	
		Weaning Weight Not Below	Yearling Weight Not Below
Angus	7	25	49
Angus Plus	(-1.2)	18	32
Beefmaster	(-.09)	-5	-7
Brangus	(-1.2)	11	18
Braunvieh	2.4	-12	-18
Charolais	12.3	7	13
Chianina (Chi-Angus)	(-.9)	19	34
Gelbvieh	112	30	55
Hereford	2.1	26	43
Limousin	12.3	26	51
Maine-Anjou	(.1)	29	63
Red Angus	7	18	32
Red Poll	(0.0)	-3	-4
Salers	(-1.5)	-3	-6
Santa Gertrudis	(-1.3)	-5	-6
Senepol	(-1.6)	-2	-5
Shorthorn	6.1	2	6
SimAngus	(-.7)	23	39
Simmental	12.1	23	39
Tarentaise	3	-9	-3

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

²The bull must meet the EPD requirement for either Weaning Weight or Yearling Weight. The bull's EPD must be equal to or greater than the listed value.

Heifer Acceptable – This is a specialty-type bull that should be used when a high percentage of first-calf heifers are to be bred. For larger, heavier birth weight breeds it may be difficult to find a Heifer Acceptable bull. Typically, easy calving bulls do not express as much growth in their calves. *To maintain an acceptable level of growth, bulls with extremely low weaning and/or yearling weight EPDs should be avoided.*

Terminal Bulls

Breed	Calving Ease or (BW)	Growth (either) ²	
		Weaning Weight Not Below	Yearling Weight Not Below
Angus	-4	40	73
Angus Plus	(5.1)	36	63
Beefmaster	(.9)	1	2
Brangus	(4.0)	23	37
Braunvieh	-2.8	5	9
Charolais	-6.2	20	36
Chianina (Chi-Angus)	(6)	33	56
Gelbvieh	97	43	75
Hereford	-6.5	40	67
Limousin	0.0	39	72
Maine-Anjou	(6)	47	90
Red Angus	-4	36	63
Red Poll	(3.4)	3	3
Salers	(3.2)	10	16
Santa Gertrudis	(2.7)	7	8
Senepol	(3.2)	9	11
Shorthorn	-4.3	17	26
SimAngus	(5.0)	33	56
Simmental	-.7	33	56
Tarentaise	-5	11	21

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

²The bull must meet the EPD requirement for either Weaning Weight or Yearling Weight. The bull's EPD must be equal to or greater than the listed value.

Terminal – This is a specialty-type bull that should be used when replacement females will not be retained. The purpose of this bull is to produce calves with exceptional feeder calf performance. Therefore, milk can be disregarded and growth should be emphasized. *Upper extremes should be avoided if the cow size is large and there is danger of producing carcasses that are heavier than the accepted standard.*

The values listed for Calving Ease/Birth Weight in this category only eliminate the very worst calving difficulty bulls. Producers should consider how many first-calf heifers are to be bred when determining their level of Calving Ease/Birth Weight. For increased security, choose a bull that meets the Heifer Acceptable category. If any heifers are to be bred then it is recommended to use the Calving Ease/Birth Weight guidelines for a Balanced Trait Bull.

Balanced Trait Bulls

Breed	Calving Ease or (BW)	Growth (either) ²				Milk	
		Weaning Weight		Yearling Weight		Not Below	Not Above
		Not Below	Not Above	Not Below	Not Above		
Angus	4	30	47	57	85	14	25
Angus Plus	(.6)	24	44	42	76	14	25
Beefmaster	(0)	-2	5	-3	8	0	8
Brangus	(1.6)	13	31	22	50	6	18
Braunvieh	0	-2	13	-4	23	-1	4
Charolais	5.1	10	30	18	50	3	14
Chianina (Chi-Angus)	(2.5)	23	41	39	70	6	15
Gelbvieh	105	34	49	61	86	15	22
Hereford	-.2	30	47	50	80	11	23
Limousin	6.2	29	46	56	82	15	25
Maine-Anjou	(3.1)	35	54	72	102	17	27
Red Angus	4	24	44	42	76	14	25
Red Poll	(.6)	-1	7	-1	8	0	4
Salers	(.7)	1	19	0	30	5	14
Santa Gertrudis	(.2)	-2	13	-2	18	-2	7
Senepol	(.4)	1	15	1	19	-1	7
Shorthorn	1.4	5	25	9	40	-1	9
SimAngus	(2.0)	25	41	42	68	2	11
Simmental	7.8	25	41	42	68	2	11
Tarentaise	0	-4	22	2	36	0	4

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

²The bull must meet the EPD requirement for either Weaning Weight or Yearling Weight.

Balanced Trait –Bulls that fit these recommendations should provide moderation for calving ease/birth weight, growth and milking ability. The purpose of this bull would be to produce calves that are acceptable feeder calves, while keeping the mature size and milk level of replacement females in moderation.

Low Maintenance Bulls

Breed	Calving Ease or (BW)	Yearling Weight Not Above	Milk Not Above
Angus	-4	72	19
Angus Plus	(5.1)	62	19
Beefmaster	(.9)	1	3
Brangus	(4.0)	36	11
Braunvieh	-2.8	8	1
Charolais	-6.2	35	8
Chianina (Chi-Angus)	(6)	55	10
Gelbvieh	97	74	17
Hereford	-6.5	66	16
Limousin	0.0	71	19
Maine-Anjou	(6)	89	22
Red Angus	-4	62	19
Red Poll	(3.4)	2	1
Salers	(3.2)	15	9
Santa Gertrudis	(2.7)	7	1
Senepol	(3.2)	10	2
Shorthorn	-4.3	25	3
SimAngus	(5.0)	55	4
Simmental	-.7	55	4
Tarentaise	-5	20	0

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

Low Maintenance – This category is for producers that will be retaining and/or selling replacement females that they desire to have lower maintenance requirements. Typically, cows that have smaller mature size and less milking ability have lower maintenance requirements. The trade-off is that their siblings, which will be sold as feeder calves, will usually have less growth as well. *It is recommended to avoid the lowest extremes for either growth or milking ability.*

The values listed for Calving Ease/Birth Weight in this category only eliminate the very worst calving difficulty bulls. Producers should consider how many first-calf heifers are to be bred when determining their level of Calving Ease/Birth Weight. For increased security, choose a bull that meets the Heifer Acceptable category. If any heifers are to be bred then it is recommended to use the Calving Ease/Birth Weight guidelines for a Balanced Trait Bull.

High Productivity Bulls

Breed	Calving Ease or (BW)	Growth (either) ²		Milk Not Below
		Weaning Weight Not Below	Yearling Weight Not Below	
Angus	-4	41	71	20
Angus Plus	(5.1)	38	59	20
Beefmaster	(.9)	1	2	4
Brangus	(4.0)	24	34	12
Braunvieh	-2.8	5	8	1
Charolais	-6.2	22	33	9
Chianina (Chi-Angus)	(6)	34	53	11
Gelbvieh	97	44	73	18
Hereford	-6.5	41	64	17
Limousin	0.0	40	69	20
Maine-Anjou	(6)	48	87	23
Red Angus	-4	38	59	20
Red Poll	(3.4)	4	2	2
Salers	(3.2)	12	13	10
Santa Gertrudis	(2.7)	7	7	2
Senepol	(3.2)	10	10	3
Shorthorn	-4.3	17	23	4
SimAngus	(5.0)	34	54	5
Simmental	-.7	34	54	5
Tarentaise	-5	14	17	1

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

²The bull must meet the EPD requirement for either Weaning Weight or Yearling Weight. The bull's EPD must be equal to or greater than the listed value.

High Productivity – Producers with extremely good management may consider bulls that meet these guidelines. Feeder calves produced by bulls from this category should exhibit good growth and replacement females should have exceptional milking ability. The trade-off is that replacement females will be larger and have higher maintenance costs. If these cows do not receive adequate nutrition then they will lose body condition and there will likely be reduced reproduction rates. *This option is not for everyone and total herd performance should take precedence over individual calf performance.*

The values listed for Calving Ease/Birth Weight in this category only eliminate the very worst calving difficulty bulls. Producers should consider how many first-calf heifers are to be bred when determining their level of Calving Ease/Birth Weight. For increased security, choose a bull that meets the Heifer Acceptable category. If any heifers are to be bred then it is recommended to use the Calving Ease/Birth Weight guidelines for a Balanced Trait Bull.

Carcass Merit Bulls

Breed	Calving Ease or (BW) ¹	Carcass Weight or (Yearling Weight) ²		Yield Grade Indicator ³	Quality Grade Indicator ⁴
		Not Below	Not Above		
Angus Ultrasound Carcass	-4	-12	23	.13/-.001 (C) .13/.002 (C)	.05 .13
Angus Plus	(5.1)	(26)	(82)	(-.03/0.0) (C)	.06
Beefmaster	No Carcass EPDs – Do not qualify				
Brangus	(4.0)	(12)	(62)	.24/-.001 (C)	-.01
Braunvieh	-2.8	-6.9	6.8	0/0 (C)	0
Charolais	-6.2	-4	27	.14/-.004 (C)	-.01
Chianina (Chi-Angus)	(6)	-16	17	.09 (B)	-.10
Gelbvieh	97	-10	11	(.07/0.0) (C)	-.03
Hereford	-6.5	(37)	(90)	(.05/0.0) (C)	-.01
Limousin	0.0	-5	34	.02 (A)	-.03
Maine-Anjou	(6)	-5	22	.31 (B)	.17
Red Angus	-4	(26)	(82)	(-.03/0.0) (C)	.06
Red Poll	No Carcass EPDs – Do not qualify				
Salers	(3.2)	.8	26	0.0 (B)	-.1
Santa Gertrudis	No Carcass EPDs – Do not qualify				
Senepol	No Carcass EPDs – Do not qualify				
Shorthorn	No Carcass EPDs – Do not qualify				
SimAngus	(5.0)	-22	17	0.0 (A)	.06
Simmental	-.7	-22	17	0.0 (A)	.06
Tarentaise	No Carcass EPDs – Do not qualify				

¹Calving Ease EPDs are to be used unless the value is in parentheses which indicate that the Birth Weight EPD should be used. Remember: Calving Ease EPDs are the listed value or greater; Birth Weight EPDs are the listed value or less.

²Carcass Weight EPDs are to be used unless the value is in parentheses which indicate that the Yearling Weight EPDs should be used.

³Yield Grade indicator is different between breeds. The letter in parentheses refers to the following EPD values: A = Yield Grade EPD; B = % Retail Product EPD; and C = Rib Eye Area (REA) / Fat EPDs. For % Retail Product and REA the bulls EPD must be equal to or greater than the value listed; for Yield Grade and Fat the EPDs must be equal to or less than the value listed. Angus must meet either the Carcass or the Ultrasound values for REA and Fat.

⁴Quality Grade indicator is either the Marbling or Percent IMF EPD depending on the breed.

Carcass Merit – Producers that will be retaining ownership of their calves and/or being paid for carcass merit should place additional emphasis on those traits. A Carcass Merit bull may easily fit one of the other categories, but would also produce calves with acceptable carcass characteristics. Traits of economic importance would be carcass weight, marbling (% intra-muscular fat) and lean to fat ratio (Yield Grade, % retail product or rib eye area/fat thickness). The pricing scheme that the calves will be sold under will determine the level of emphasis to be placed on each trait. For example, if the calves are to be marketed on a “High Quality Grid” then greater emphasis would be placed on increasing marbling, while maintaining acceptable carcass weights and cutability. *Also, remember that as you increase carcass weight you also increase mature cow size of replacement females.*

The values listed for Calving Ease/Birth Weight in this category only eliminate the very worst calving difficulty bulls. Producers should consider how many first-calf heifers are to be bred when determining their level of Calving Ease/Birth Weight. For increased security, choose a bull that meets the Heifer Acceptable category. If any heifers are to be bred then it is recommended to use the Calving Ease/Birth Weight guidelines for a Balanced Trait Bull.