



Vol 1. #12. Good morning. This week's articles focus on what happens if you expire and do not have a will. Dr. Marsha Goetting provides you with a couple of great resources to get you started with planning for the end. Secondly, one of the famous applied beef reproductive physiologists of the past 50 years was Jim Wiltbank. I came across an article he wrote in 1990. I believe the points he made then are still very applicable today. Have a good rest of the week. John Paterson, Extension Beef Specialist, Montana State University

Dying Without a Will in Montana--Who Get's Your Property?

Those who have read the estate planning MontGuides from Montana State University Extension will be interested in a new helpful Web site: Dying Without a Will in Montana www.montana.edu/dyingwithoutawill/. Simply by clicking "yes" or "no" to a variety of questions Montanans can learn how their property would be distributed if they pass away without writing a will. Keep in mind that if you pass away without a written will only your relatives receive your property and if you have no relatives the state of Montana receives your property. If you have a favorite charity or educational institution such as MSU these groups receive nothing unless you write a will.

While the 39 illustrations describe "typical" family situations, if users discover their family scenario is not illustrated, they have the opportunity to contact Marsha Goetting, MSU Extension Family Economics specialist, for further information. The site was reviewed for legal accuracy by a member of the School of Law, University of Montana and the Business, Estates, Tax, Trust, and Real Property Section of the State Bar of Montana.

For people who have "slow" or no internet service, an interactive CD with the same information is available at no charge by contacting goetting@montana.edu. Funding for this Web site and CD was provided by the Washington State University Western Center for Risk Management Education, the USDA Cooperative State Research Education and Extension Service (CSREES), and Montana State University Extension. Other partners for the project are the State Bar of Montana and the Montana Grain Growers Association.

If you haven't viewed the variety of MSU Extension estate planning MontGuides go to www.montana.edu/extensionecon/estateplanningpublications.html or contact your local County or Reservation Extension Agent.

Marsha A. Goetting, Ph.D., CFP®, CFCS
Professor and Extension Family Economics Specialist
Dept. of Agricultural Economics & Economics
P. O. Box 172800
208 C Linfield Hall
Montana State University
Bozeman, MT 59717-2800
E-mail: goetting@montana.edu, Voice: 406-994-5695 ,Fax: 406-994-4838,

Challenges for Improving the Calf Crop (Part I)¹

J. N. Wiltbank²

It is widely accepted that reproductive performance is the most important economic trait in a beef cow herd. Willham (1973) illustrated that reproduction in relative economic terms was 10 times as important as production and 20 times as important as product. In contrast, only 10% of the variation in reproduction will respond to selection while 40 and 50% of the variation in production and products, respectively, will respond to selection ([Table 1](#)).

The figures in [Table 1](#) emphasize that an economically viable beef cow operation must have good reproduction. Some improvement in reproduction can come through selection; however, most improvement must come as a result of changes in environment or management. Therefore, reproduction can be improved rapidly because management can be changed quickly. The challenge is to make management changes that will improve reproduction and increase net income. Information necessary to improve calf crop is readily available, yet much of that information has not been applied by the individual rancher. The challenge today is to find ways to economically apply the information that is available and that will become available in the future to improve reproductive performance on ranches.

Utilizing the following six steps will help the rancher apply the available information to his ranch; thus meeting the challenge.

1. Study carefully the available information for improving reproduction and summarize into principles or laws that you can use.
2. Utilize the principles and develop a plan for improving reproduction in your herd.
3. Predict the economic value of the plan using the resources available to you.
4. Modify the plan to make it economically viable and physically possible on your ranch.
5. Develop a calendar so the plan can be executed.
6. Observe results and modify the plan.

To help understand how to apply this plan to a beef cattle operation, each of these steps will be discussed.

FIRST STEP

Study carefully the available information and summarize into principles.

Nine principles will be discussed in this step and information given to support each principle. The information supplied here is not meant to be all that is available. However, it is thought to be sufficient to support the principle stated. To make this step effective in a particular beef cow operation, the manager must study the available information and develop his own principles.

First Principle:

In studies at four locations, calf crop weaned varied from 77 to 65%. In all locations the largest losses in potential calves occurred because cows did not get pregnant or calves were lost at or near birth [[Table 2](#), Wiltbank (1983)]. The principle that can be generated from these data is that most potential calves are lost in disease free herds because:

- a. Cows do not get pregnant.
- b. Losses at or near birth are high.

Second Principle:

Studies from three different states indicate that a large amount of variation exists in the proportion of cows showing heat and being bred the first 21 days of the breeding season in different single sire herds at each of these locations [[Table 3](#), Wiltbank (1983)]. As an example, only 40% of the cows in one herd in Nebraska showed heat and were bred; while in another herd at the same location, 73% of the cows were in heat and bred. Similar variations were noted in the proportion of cows becoming pregnant after being bred one time. In one herd in Louisiana only 32% of the cows conceived after being bred one time. While in another herd 78% conceived after one breeding. Thus, large variation in these two measures of reproductive performance exist.

In the cows which were open at the end of the breeding season from 14 to 22% failed to show heat and, consequently, were not bred during the breeding season at the different locations. An additional 22 and 34% were only bred one time while between 36 and 56% of the open cows were bred two or more times.

Thus, many cows don't show heat early in the breeding season while some don't show heat at any time during the breeding season. Therefore, pregnancy rate would be improved if methods could be devised so 90-100% of the cows showed heat early in the breeding season and 80-85% conceived on first service.

A study conducted in Utah [Anderson et al. (1986)] can be used to illustrate the importance of this concept. In one group of 98 cows, 95% were bred the first 21 days of the breeding season and 80% conceived on first service ([Table 4](#)).

Consequently, 80% of these cows calved in the first 20 days of the calving season and 99% of the cows that entered the breeding herd calved by day 60 of the calving season. Contrast this to a group of 91 cows in which only 59% showed heat in the first 20 days of the breeding season and only 50% conceived on first service. Only 28% of these cows calved in the first 20 days of the calving season and by day 60 of the calving season only 72% had calved.

Utilizing the concepts gleaned from these data, the second principle can be extracted.

Pregnancy rates would be increased if:

- a. Ninety to Ninety-five percent of the cows showed heat the first 20 days of the breeding season.
- b. Seventy to eighty percent of the cows conceived on first service.

Third Principle:

If the second principle is correct, it would appear important to review the reasons why so many of the cows in one group in the study Utah were bred the first 20 days of the breeding season. The three things which were done to insure that cows were bred the first 20 days of the breeding season were: (1) all cows calved in a 60-day calving season; (2) all cows were in moderate body condition at calving time; and (3) calves were removed from the cows for 48 hours at the start of the breeding season [Anderson et al. (1986)]. Some data supporting these three concepts will be reviewed briefly.

In cows in good body condition and calving from day 21 to 40 of the calving season, 96% would be expected to be bred the first 20 days of the breeding season compared to 79% of the cows in moderate body condition and 55% of the cows in thin body condition calving at a similar time [Table 5, Whitman (1975)]. In cows in moderate body condition the proportion bred the first 20 days of the breeding season varied from 92% in cows calving before day 20 of the calving season to 7% in cows calving from day 61 to 80 of the calving season. If the goal is to have 95% of the cows bred the first 20 days of the breeding season, then cows must be in moderate or good body condition at calving time and calve the first 60 days of the calving season.

Removal of the calf from the cow for 48 hrs. has been shown to be useful in increasing the number of cows bred early in the breeding season [Smith et al. (1979)]. In 52 control cows 31% were bred the first 21 days of the breeding season while 62% were bred in the group of cows where calves were removed for 48 hrs. (Table 6). The proportion pregnant the first 20 days of the breeding season was 17% in control cows compared to 44% in the 48-hr.- calf-removal group.

To make certain that most young cows are bred the first 20 days of the breeding season, young cows must be handled separately from the older cows. In a group of cows where young cows and old were handled together, the pregnancy rate differed by 10% [Wiltbank (unpublished)]. In contrast, when young cows and old cows were handled in separate groups no difference in pregnancy rate was noted.

The importance of providing better nutrition for young cows can be illustrated by using some data from a study in Louisiana [Wiltbank and Harvey (1963)]. Pastures were classified as poor or good. Calf crop differed by 6% in old and young cows on good pasture while a 29% difference was noted between the two groups of cows on poor pasture. In young cows calf crop was 31% lower in cows grazing poor pasture while the difference in old cows grazing good and poor pasture was only 8%.

Utilizing the information from these three studies, the third principle was generated.

Ninety percent of cows will show heat the first 20 days of the breeding season if:

- a. Cows calve in a 60-day period and heifers calve in a 45-day period.
- b. Cows are in at least moderate body condition at calving time.
- c. Calves are removed for 48 hours at the start of breeding season.
- d. Young cows (first calf) are separated from older cows.

Fourth Principle:

Optimum conception rates at first service are not achieved in cows which are losing weight at the time of breeding [Wiltbank et al. (1964), Dunn et al. (1969), Whitman (1975)] and in cows bred to bulls of unknown fertility [Smith et al. (1981), Wiltbank and Parish (1986)]. In the study utilized here to illustrate the effect of weight loss on pregnancy rate only 43% of the cows losing weight near breeding became pregnant after one breeding [Wiltbank et al. (1962)]. In contrast 67% of the cows which experienced no weight change conceived. Differences of 28 and 18% in pregnancy rate were noted after 20 and 90 days of breeding, respectively.

An additional study with dry cows might be useful in pointing out the importance of this concept [Smith et al. (1980)]. Dry cows in moderate or thin body condition at the time the breeding season commenced were fed either a low or high level of energy and bred for 45 days. In the thin cows fed the high level of energy, 72% became pregnant after one breeding compared to 44 to 54% in the other three groups. Pregnancy rate after 45 days of breeding was substantially higher in thin cows fed high levels of energy ($P < .05$).

Large variations in fertility were previously noted in bulls (Table 3). Other data used 40 two-year-old bulls that were exposed individually to approximately 100 heifers for 8 to 10 days [Smith et al. (1981)]. The pregnancy rate of heifers in heat varied from 0 in one group of heifers to 85% in another group. An average of 80% of the heifers in heat were bred and ranged from 0 to 100% in the different groups of heifers. The proportion of heifers pregnant of those bred varied from 0 to 100%. These data indicate that bulls differ both in libido and in ability to get heifers pregnant that they breed.

In another study the pregnancy rate in groups of cows or heifers bred to bulls that had not been selected for semen quality was compared to group bred to bulls that had semen 70% or more normal [Wiltbank and Parish (1986)]. The pregnancy rate differed by 6% one year and 5% another year.

The fourth principle was then generated from these observations.

Seventy to eighty percent of the cows will conceive on first service if:

- a. Cows are gaining weight at time of breeding.
- b. Cows are bred by fertile bulls.

Fifth Principle:

A high proportion of the calf loss occurs at or near birth. Patterson and co-workers (1987) reported that 57% of the calves that died were lost on the day of calving and an additional 11% were lost between one and three days of age. They also reported that 44% of the calves died as a result of calving problems.

The value of a short, concentrated calving season on calf losses was shown by Anderson et al. (1986). The losses from birth to weaning were 3% in a group of cows where 91% of the cows calved in the first 40 days of the calving season compared to 9% in a group of cows that calved over a 90-day period.

Utilizing these facts then the fifth principle is:

The losses at or near birth can be decreased if:

- a. Incidence of calving problems is decreased.
- b. Someone is present at time of birth and can render assistance when needed.

Sixth Principle:

The main reason for calving problems is a disproportion in the size of the calf and the size of the pelvic opening [Rice and Wiltbank (1978)]. The incidence of calving difficulty varies greatly in calves sired by different bulls. In the study used here as an example, 12 Angus bulls were mated to either Angus or Angus X Hereford crossbred heifers [Price and Wiltbank (1978)]. The number of calves born sired by the different bulls varied from 17 to 85. With most bulls siring approximately 40 calves. The incidence of calving difficulty was 47% in calves sired by two bulls while in calves sired by another bull only 9% of the calves required assistance.

An important point that must be considered is the reliability of predicting levels of calving difficulty in calves sired by the different bulls. To illustrate the difficulty of determining reliability a confidence interval was calculated for bulls in the study used here. This interval estimates the range in which the percentage calving difficulty would be expected to fall if the percentage was known exactly for each bull. Note the overlap of this confidence interval in the different bulls. As an example, compare bull number three with bull one. Calving difficulty in bull three was 47% and in bull one 20%. The actual mean for bull three as estimated by the confidence interval should fall between 31 and 62%, while the actual mean for bull one was estimated to fall between 10 and 36%. The overlap of the two confidence intervals indicate that calving difficulty in the two bulls might be the similar. The only bull in this group of 12 bulls that might be relied on to reduce calving difficulty is bull five. There was little or no overlap in confidence interval between bull five and the six bulls with the greatest amount of calving difficulty. The data indicate that while differences in calving difficulty exist between bulls only bulls that have sired a large number of calves with light birth weights and low levels of calving difficulty can be depended upon to reduce calving difficulty when bred to your heifers. In practical situations, only bulls in A.I. studs can be utilized with great reliability to reduce calving difficulty. Here one must carefully select bulls with a low EPD for birth weight and use only bulls with high accuracy and bulls of certain breeds.

The other variable that influences calving difficulty is the size of the pelvic opening [Price and Wiltbank (1978), Wiltbank and Remmenga (1982), Bellows et al. (1971, Short et al. (1979)]. The most important variable determining pelvic size is the weight of the heifer [Price and Wiltbank (1978), Bellows et al. (1971)]. The correlations between pelvic area and heifer weight at various times varied from .50 to .61 [Price and Wiltbank (1978)].

The other fact to remember about pelvic opening is that heifers with a small pelvis at breeding time will have a small pelvis at calving time (Prentiss, 1971). A group of heifers was divided by size of the pelvic opening into four groups at the time of breeding. The pelvic opening of the heifers was measured periodically. Pelvic area was found to grow in a linear fashion, consequently, the average size of the pelvic opening differed between the four groups at calving time. However, there was an overlap in pelvic size between the four groups of heifers. These data indicate that heifers which attain target weight and continue to grow would have large pelvic openings at calving time.

Experience in practical situations has shown that heifers that are well developed (i.e. reach target weight) and are bred to bulls that sire calves with small birth weights have little or no calving difficulty.

This information was utilized to generate the sixth principle.

Incidence of dystocia is decreased if:

- a. Heifers are bred to a bull known to sire calves with light birth weights.
- b. Heifers weigh at least 950 lbs at calving time.

Seventh Principle:

The next principle is a matter of economic consideration. Manpower cannot be supplied economically to a group of cows for calving purposes for long extended periods of time. However, it might be feasible for short periods of time if calf losses could be decreased substantially. Therefore to be present at time of birth and render assistance, cows and heifers must calve in a short, concentrated period.

Eighth Principle:

Any animal present on the ranch which does not produce positive cash flow must be considered a non producer. In all cases these animals not only don't produce positive cash flow they cause a negative cash flow. Three types of animals which fit into this category are bulls, replacement heifers and cows not producing a calf. As an example, consider two herds. In herd one replacement heifers were calved first at two years of age and 85% of cows bred weaned a calf. In herd two heifers calved first at three years of age and 70% of cows bred weaned a calf. There are several interesting differences in these two herds. First if you expose 100 cows to the bulls and keep 20% replacement heifers in both herds,

there are 22 more animals in herd two and you wean 15 fewer calves. Sixty-nine percent of the animals in herd one are producers compared to only 48% in herd two. Utilizing these concepts the eighth principle was generated.

The number of non-producers in a herd can be kept low if:

- a. Heifers calve at two years of age.
- b. Bull numbers are minimal.
- c. High weaning rates are achieved in the cow herd.

Table 1. Economic and Genetic Importance of Various Traits		
	Relative economic values	% Variation heritable
Reproduction	20	10
Production	2	40
Product	1	50

Table 2. Present reproductive performance on EZ Ranch

	Cows		Replacement heifers		Bulls	Total
	<u>3 yr old</u>	4 yr and older	1yr old	2 yr old		
Number	115	485	120	120	45	885
<u>Pregnant</u>	<u>(26)</u>	<u>(85)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>(62)</u>
<u>Calving</u>	<u>(25)</u>	<u>(83)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>(61)</u>
<u>Weaning a calf</u>	<u>(24)</u>	<u>(77)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>(55)</u>
<u>Non-producers</u>	<u>(76)</u>	<u>(23)</u>	<u>(100)</u>	<u>(100)</u>	<u>(100)</u>	<u>(45)</u>
<u>Non-producers in this category</u>	<u>(22)</u>	<u>(23)</u>	<u>(30)</u>	<u>(9)</u>	<u>(11)</u>	
Calves born after cows have calved (accum):						
20 days	(7)	(31)		(9)	0	(25)
40 days	(14)	(62)	0	(24)	0	(52)
60 days	(21)	(72)	0	(47)	0	(66)
80 days	(69)	(83)	0	(71)	0	(80)
100 days 29 402 106 537(100)	(100)	(100)	0	(100)	0	(100)
^a Age at breeding						
Calving starts December 15 and ends March 25.						
Breeding starts March 8 and ends June 16.						
Calves are weaned October 15.						
Average age at weaning 265 days.						
Figures in () are percentages.						

Table 3. Present economic situation on EZ Ranch

Calves weaned and Calves sold

	Avg. (lbs)	Number	Total weight (lbs)	Price per cwt (\$)	Total (\$)
<u>Steers</u>	<u>500</u>	<u>244</u>	<u>122,000</u>	<u>88</u>	<u>107,360</u>
Heifers 243 --- -- -	460	---	---	---	---
Replacement--- - -- ----	<u>480</u>	<u>120</u>	---	---	---
Sell	440	123	54,120	0.85	46,002
Total sold Per animal		.55	199		173

Table 4. Estimate of nutrient requirements available from grazing in different months (% of needed nutrients)

	Replacement heifer				
	Wet cow (%)	Dry cow (%)	Growing (%)	Pregnant (%)	Bull (%)
January	50	90	80	90	85
February	90	100	85	100	100
March	95	100	95	100	100
April	100	100	100	100	100
May	100	100	100	100	100
June	100	100	100	100	100
July	100	100	100	100	100
August	100	100	100	100	100
September	85	100	70	100	100
October	75	100	65	100	100
November	55	100	60	90	100
December	45	85	60	75	75

Table 5. Estimated increases in cost

Dry cows							
	Total	Thin	Wet cows	Heifers	Bulls	Total ton	Total \$
Number animals	703	140	703	160	22	--	--
Feed							
Molasses (\$80/ton)							
Months fed	Dec-Jan		Feb-Apr		Dec-Jan		
Days fed	60		75		60		
Lbs/head/day	4		6		4		
Total (tons)	85		158		3	246	19,680
Protein (\$240/ton)							
Months fed	Dec-Jan		Feb-Mar		Dec-Jan		
Days fed	60		60		60		
Lbs/head/day	1		1		1		
Total (tons)	21		21		1	43	10,320
High energy (\$155/ton)							
Months fed -		Sep-Oct	Apr-May	Sep-Feb			
Days fed		60	35	180			
Lbs/day/head		5	4	4			
Total (tons)		21	49	58		128	19,840
Total feed							\$49,840

A I Program for Heifers

Technicians 230 heifers @ \$5 \$1150

Semen 230/\$10 2300

SMB 160 @ \$5.50	880
Labor - work heifers and heat check	800
Total	\$ 5,130
Calving - 20 days labor/\$75 per day	1,500
Help at start of breeding, sort and work calves	
2 days/\$100 per day	200
TOTAL FINANCIAL COSTS	\$56,670

<u>Table 6. Growth of Replacement Heifers</u>	
<u>Number</u>	160
<u>Average weaning weight (lbs)</u>	500
<u>Desired weight at breeding (lbs)</u>	700
<u>Gain needed (lbs)</u>	200
<u>Days weaning to breeding</u>	236
<u>ADG weaning to breeding</u>	0.8
<u>ADG during breeding</u>	1.0
<u>Weight at end of breeding</u>	745
<u>Desired weight at calving</u>	950
<u>Weight gain needed</u>	205
<u>Days end breeding to calving</u>	237
<u>ADG needed</u>	0.86

¹In: 39th Annual Florida Beef Cattle Short Course Proceedings; 1990 May 24; Gainesville, FL. University of Florida (Gainesville): Animal Science Department.238p.

²Animal Science Department; Brigham Young University

Contact John Paterson, MSU Extension Beef Specialist at johnp@montana.edu or 406.994.5562