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Beef Cattle Management Update

LOW INPUT, HIGH OUTPUT MANAGEMENT PRACTICES FOR BEEF COW/CALF HERDS

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Profit in beef cow/calf herds is quite management dependent. For the most part, managers that make the right decisions make money and others lose money, except in unusual price years. Producers need to know which management practices are cost effective so that they can implement them. This paper will describe a number of management practices that can be implemented, along with the expected performance and profit response to those practices, in some cases. Producers should think in terms of improving profitability and efficiency, rather than simply increasing production when considering adoption of any practice.

I. Factors Affecting Profitability in Beef Cow/calf Herds.

Four factors determine the bottom line in cow/calf herds:

- Percentage of calf crop weaned or marketed
- Weight of calves at weaning or sale
- Price received for calves
- Cost of production

Management practices considered should either raise the weaning weight, weaning rate or price of calves, or reduce the cost of producing them.

II. Increasing Calf Crop Percentage.

Percentage calf crop weaned should be defined as the number of calves weaned per 100 cows exposed to breeding. It is important to calculate calf crop percentage this way, otherwise reproductive performance of the cow herd will be overestimated. Failure of cows to become pregnant is by far the largest factor (Table 1). Calf death at birth also contributes significantly.

Table 1. FACTORS AFFECTING CALF CROP PERCENTAGE

Factor	Percent
Cows fail to become pregnant	17.4
Calves lost during gestation	2.3
Calves lost at birth	6.4
Calves lost birth to weaning	2.9
Total losses	**28.9**
Net calf crop percentage	71.1

Nutrition

Proper nutrition is critical to reproductive success. This does not necessarily mean supplying a lot of expensive feed, timing of feed supplementation can be more important than quantity feed is supplied. Feed should be offered in order to meet the needs of breeding females at the most critical times. At other times, feed costs can be conserved through use of low cost feedstuffs. In addition to minimizing cost, a nutrition program for the breeding herd should have three goals: to have cows in the proper condition at calving time; to have cows in positive energy balance as soon as possible after calving; and to develop heifers to the proper weight before breeding. To best describe cow nutrient requirements, divide the beef cow year, based on production and nutrient needs. Following is a description of the cow year, with the day of calving as the first day of the cow year:

Period (days)	Description	Nutrient needs
Period 1 = day 1-80	Post-calving	High
Period 2 = day 81-205	Pregnant and lactating	Moderate to high
Period 3 = day 206-315	Mid-gestation	Low
Period 4 = day 316-365	Pre-calving	Moderate

Table 2. NRC NUTRIENT REQUIREMENTS FOR 1100 LB COW (15 lb of milk production)

	Period			
	1	2	3	4
TDN, lb/d	13.3	11.5	9.5	11.2
Protein, lb/d	2.3	1.9	1.4	1.6
Calcium, g/d	33	27	17	25
Phosphorus, g/d	24	22	17	20
Vitamin A, 1000 IU/d	39	36	25	27

Periods 1 and 4, from 50 days prior to calving to 80 days post-calving, are the most critical. Table 3 illustrates the effect of pre-calving energy levels on reproduction. Too little energy during Period 4 (50 days prior to calving) will reduce the percentage of cows cycling by the start of the breeding season. Cows will cycle and become pregnant eventually even if pre-calving energy levels are low, however, calves will be born late and an annual calving cycle will not be maintained, since cows must become pregnant within 80 days of calving in order to have an annual calving cycle.

Table 3. EFFECT OF PRE-CALVING ENERGY LEVELS ON REPRODUCTION

	Energy level	
Item	Low	High
TDN/day, lb	4.5	9.0
120-day gain before calving, lb	-118	+67
In heat by 60 days, %	45	80
Pregnant after 20 days breeding, %	46	60
Pregnant after 90 days breeding, %	95	95

Wiltbank, et al.
Both groups fed 16 lb TDN/d after calving.

Cow condition score (CS), which is largely a function of pre-calving energy intake, at calving has the greatest effect on the percentage of cows in heat (Table 3). A nine point visual condition score system has been devised and is a useful tool. Following are descriptions of condition scores 1-9:

Condition score 1. Emaciated. No visible fat over shoulder, ribs, back, hooks or pins, tail head and ribs project quite prominently, little evidence of muscling.

Condition score 2. Poor. Little evidence of fat deposition but some muscling in hindquarters, some tissue cover along spine, but spinous processes are easily seen with space between them.

Condition score 3. Thin. Backbone highly visible but some fat cover over loin back and foreribs. Spaces between spinous processes still visible but less pronounced.

Condition score 4. Borderline. Foreribs are not noticeable but 12th and 13th are. Transverse spinous processes can be identified only by palpation and is rounded, rather than sharp. Muscling only slightly inhibited. Some fat cover over hooks.

Condition score 5. Moderate. 12th and 13th ribs not visible if cow has normal fill. Transverse spinous processes can only be felt with firm pressure. Normal muscling.

Condition score 6. High moderate. Ribs fully covered, not visible. Firm pressure now required to feel transverse processes. Obvious fat cover over foreribs and on each side of tailhead.

Condition score 7. Good. Cow appears fleshy and obviously has considerable quantity of fat. Abundant fat cover over ribs and patchiness apparent around pins. Some fat around vulva and in crotch.

Condition score 8. Fat. Most bone structure has disappeared from sight, spinous processes almost impossible to palpate. Thick fat cover and substantial patchiness.

Condition score 9. Extremely fat. Bone structure no longer visible and barely palpable. Tail head buried in fat. Mobility may even be impaired by large fatty deposits.

Cattlemen should become familiar with CS descriptions, especially description of CS 4 through 8, which will describe most cows. CS of cows should be routinely appraised and cows sorted into groups that need to gain (CS 5 or less), lose (CS 8 or 9) or maintain condition. Weaning time, and 50 days prior to calving are appropriate times to condition score cows.

Table 4. EFFECT OF BODY CONDITION AT CALVING ON % OF COWS IN HEAT

	Cow's condition at calving		
Post-calving days	Thin	Moderate	Good
	---------- % of cows in heat ----------		
30	3	7	13
60	46	61	91
90	66	92	100

Whitman, 1975.

Post-calving energy levels have little influence on the percentage of cows in heat, but dramatically influence conception rate (Table 5).

Table 5. EFFECT OF POST-CALVING ENERGY LEVELS ON REPRODUCTION

	Energy level	
Item	Low	High
TDN/day, lb	8	16
Gain, calving to 90 days, lb	-90	-14
In heat by 60 days, %	81	80
Pregnant after 20 days breeding, %	34	60
Pregnant after 90 days breeding, %	77	95

Wiltbank, et al.
Both groups fed 9 lb TDN/d before calving.

Table 6. INCOME GAINED FROM INCREASED CONCEPTION RATES (Nebraska, 1990)

$/100 cow herd

	Breeding season length, d		
Change in first service conc. rate	45	70	120
50 to 60%	1875	1059	621
60 to 70%	673	531	1064
70 to 80%	448	701	425
50 to 80%	2989	2291	2110

Suckling manipulation

Early weaning, once-daily suckling (ODS), and temporary calf removal (TCR) are suckling manipulation techniques that have been shown to improve rebreeding performance in some situations. While early weaning is impractical as a tool to shorten the postpartum interval, ODS and TCR merit consideration. Table 7 includes data from a study in which ODS shortened the postpartum interval of first calf Brahman-Hereford cross heifers, without decreasing milk production or calf gains. Other studies have resulted in less promising data. The difference in the results may lie in the cattle used. In general, ODS is successful in females that are in thin condition or under nutritional stress, especially first-calf heifers, but has little effect on females that are in moderate or higher condition, and are fed to meet requirements. TCR produces similar results. Research conducted at Clemson University has shown no advantage of TCR in cows that are CS 5 or higher. In studies involving first-calf heifers and thin cows, TCR has proved beneficial. ODS and TCR probably have little value for mature, well fed cows. These practices may not fit the title of this publication due to their high labor requirement. Nonetheless, in some situations these practices could improve a poor situation.

Table 7. EFFECTS OF ONCE-DAILY SUCKLING ON REBREEDING PERFORMANCE AND MILK PRODUCTION OF FIRST-CALF HEIFERS AND GROWTH PERFORMANCE OF THEIR CALVES, TEXAS

	Suckling	
Period	Normal	Once-daily
	---------- wt of heifers, lb ----------	
30 days postpartum	732	741
First estrus	742	750
Weaning	738	794
	---------- 4-hr milk production, lb ----------	
30 days postpartum	2.7	3.2
First estrus	1.8	1.5
	---------- Calf wts, lb ----------	
Birth	75	77
30 days of age	123	129
Weaning	323	324
	---------- Postpartum interval, days ----------	
	168	69

Randel, 1981.

Development of replacement heifers

Replacement heifers must be fed to grow and develop rapidly enough so that they cycle and become pregnant early enough to calve at 24 months of age. Table 8 shows the effect of initial calving group on lifetime production. Heifers that calved in the earliest group raised an average of 68 pounds of calf per year more than those in the latest group.

Table 8. EFFECT OF INITIAL CALVING GROUP ON LIFETIME PRODUCTION

Initial calving group	Avg wean wt, lb	Avg wean age, days	lb below initial group
1	443	211	---
2	432	206	11
3	416	201	27
4	409	195	34
5	375	190	68

Heifers should be weighed at weaning, and again at yearling and their diets adjusted so that they attain 65 to 70% of their mature weight by the start of the breeding season and 85% of mature weight at first calving (Table 9). Table 10 describes a study in which Angus heifers were fed to weigh either 600 or 700 lb at breeding. In this study, investing $22 more in feed during the first winter paid substantial dividends in subsequent productivity.

Table 9. RECOMMENDED WEIGHT OF REPLACEMENT HEIFERS AT BREEDING AND FIRST CALVING, BY EXPECTED MATURE WEIGHT

Expected mature weight	Weight at breeding	Weight at first calving
900	585	765
1000	650	850
1100	715	935
1200	780	1020
1300	845	1105
1400	910	1190

Table 10. HEIFER WEIGHT AT BREEDING AND PRODUCTIVITY

	Weight at breeding, lb		
Item	600	700	Diff
First winter feed cost, $	100	122	+22
Pregnant as yearlings, %	58	79	+21%
Calving in 60 days, %	63	87	+24%
Calf wean. wt, lb	360	388	+28 lb
lb weaned/hfr exposed	206	304	+98 lb
Pregnant as wet 2's, %	72	92	+20%

Hay price = $50/t, corn = $2.55/bu.

Failure to meet nutrient requirements of the cow will result in cows that are not cycling soon enough to maintain an annual calving pattern, or are cycling but fail to become pregnant when bred. Failure to meet the needs of replacement heifers can cause similar problems and can also result in heifers that are too small at calving time, which will lead to calving difficulty, poor calves, and rebreeding problems.

Genetics

One of the easiest and most effective means to increase calf crop percentage is to utilize crossbreeding, in order to realize heterosis, also called hybrid vigor. Use of a 2- or 3-breed rotational crossbreeding system will increase calf crop percentage by 4 or 8%, respectively. This is due to **maternal heterosis,** which is the increased fertility of the crossbred cow, and to **direct heterosis**, which accounts for the increased vigor and survivability of the crossbred calf.

Table 11. EFFECT OF CROSSBREEDING ON PERCENT CALF CROP WEANED

Breeding system	Weaning rate, %	Advantage over straightbreds, %
Straightbred H,A,S	75	---
2-breed rotation	79	+4
3-breed rotation	83	+8

Cundiff, 1980.

Minimizing dystocia

Calf mortality at or near time of birth is a major source of calf losses. As noted in Table 1, approximately 70% of those calves that are lost between birth and weaning are born dead or die within 24 hours of birth. Research at the U.S. Meat Animal Research Center in Clay Center, NE has shown that calves that experience calving difficulty are about four times as likely to be born dead or die within 24 hours of birth as those born without difficulty. In two separate studies that involved several thousand cows, 20% and 11.7% of those calves that experienced difficult births died, while 5% and 3% of those born unassisted died. Montana research indicates that 57% of all calf losses were due to dystocia.

Dystocia also contributes to delayed rebreeding. In the Nebraska study, 54% of cows that experienced calving difficulty bred back during a 45 day AI breeding season, while 69% of unassisted cows did. Including the clean-up period, pregnancy rates were 69 and 85% for assisted and unassisted cows, respectively. Services per conception were similar between treatments, indicating that calving difficulty caused delayed return to estrus, not less fertile estrus periods.

Steps to minimize calving difficulty are well described in other publications, but here are some general recommendations:

- Mate virgin heifers and small cows to bulls that will sire small calves. Consider breed, birth weight Expected Progeny Difference, actual birth weight and physical structure of the bull when making mating decisions.
- Feed heifers well enough to weigh at least 85% of their expected mature weight at first calving.
- Measure pelvic area in replacement heifers and cull those that are too small. Required size will differ from one breed to the next but in general, heifers of medium sized breeds should have pelvises of at least 160 square centimeters at breeding, those of large breeds, 180 or more.
- Do not retain daughters of cows that have a record of calving difficulty.
- Begin breeding heifers 21 to 30 days earlier than cows so that they can be observed more at calving time. Feed the herd late in the day during calving season so that more will calve in daylight.

Adequate bull power

Fertility of the cow is not the only variable. Use of fertile bulls, in sufficient numbers, is critical to reproductive success. Use of too few bulls will result in reduced conception rate and/or an extended calving season next year, either way resulting in fewer pounds lb of calf per cow exposed. Following are recommendations for number of cows per bull:

	Mating system	
Bull age	Pasture mating	Hand mating
Yearling	10-20	20-30
Two year old	20-30	0-40
Three and older	30-40	40-60

Bulls used must have adequate libido (sex drive) to service cows. Tests of serving capacity have shown that bulls that have adequate sex drive can still differ greatly in serving capacity. The value of those bulls with the greatest serving capacity has not been established, however, but research, as well as production practices in other countries suggests that perhaps U.S. producers expect too little from their bulls.

Presence of sufficient bull power will not guarantee pregnant cows, bulls that are used must be fertile. Newly purchased bulls, or older bulls that may have reduced fertility, should be fertility tested well in advance of the breeding season. Bull fertility tests typically cost between $30 and $60. Ten to 25% of all beef bulls are questionable or unsatisfactory breeders. This results in:

- 5-10% reduction in pregnancy rate
- delayed breeding
- strung-out calf crop

Estimated cost of sub fertile bulls	=	$6-20/cow
Estimated cost of a sterile bull	=	$40-180/cow
Typical cost of bull fertility exam	=	$2/cow

When selecting bulls, scrotal circumference (SC) should always be considered, not just because it is related to semen production traits, but also because use of bulls with large testicles will produce daughters with earlier puberty and improved fertility. As a rule of thumb, yearling bulls that will be used as terminal sires should have SC of at least 32 centimeters at 12 months of age, those to be used in rotational systems should have at least 34 centimeters at 12 months of age. Be sure that high SC measurements are due to large testicles and not due to fat deposition in the scrotum, which can occur in bulls that have been fed to gain rapidly.

IMPORTANCE OF SCROTAL CIRCUMFERENCE

SC is highly heritable (about .60)

SC of young bulls is highly correlated with semen traits:

% normal sperm	=	.58
concentration	=	.46
total sperm	=	.42

SC accurately predicts puberty in bulls:

avgas SC at puberty	=	28 cm

SC in bulls is highly correlated with age at puberty in 1/2 sisters:

among breeds	=	.98
within breeds	=	.70 to 1.00

SC is not highly related to libido

Brinks, 1983.

Other aspects of bull soundness must be considered. Bulls must maintain adequate condition throughout the breeding season, but should not be too fat. When feasible, it may be advantageous to provide supplemental feed for some herd bulls during the breeding season. Only bulls with sound feet and legs and ability to walk freely should be used. Bulls must have sound mouths and be free of sheath and prepuce problems.

III. Increasing Weaning Weights

Genetics: Crossbreeding

Importation of large framed, fast growing breeds from Europe, as well as selection for performance and size in traditional breeds, has resulted in considerable increases in weaning weights over the past few decades. Regardless of breeds chosen, proper use of a crossbreeding system will result in increased weaning weights (Table 12).

Table 12. EFFECT OF CROSSBREEDING ON WEANING WEIGHT

Breeding system	Weaning wt, lb	Advantage over straightbreds
Straightbred H,A,S	432	---
2-breed rotation	476	44 lb, 10%
3-breed rotation	487	55 lb, 13%

Cundiff, 1980.

Table 13. EXPECTED RESPONSE TO CROSSBREEDING SYSTEMS

System	Expected increase in weaning wt per cow exposed	
	(%)	(lb)
Two breed rotation	15	51
Three breed rotation	20	68
Static terminal sire	19	5
Two breed rot. & term. sire	21	71
Terminal sire x purchased F1 cows; no replacements kept	23	78
Rotate bull breed every 3-4 yr	12	41

Cundiff, 1980. Straightbred = 340 lb calf/cow exposed.

Table 14. BULL PERFORMANCE = PROFIT

Item	Mediocre bull	Better bull	Difference
WW EPD	0.0	+30.0	+30.0
Calf WW	500	530	+30.0
Calf value @$.65/lb, $	325	344.50	+19.50
Calf value @$.95/lb, $	475	503.50	+28.50

Added value of 100 calves, $1950 to 2850.

Genetics: Milk production

Inclusion of at least one heavy-milking breed in a crossbreeding plan can dramatically increase weaning weights. However, if feed resources are limited, heavy milking cows may actually be less efficient than moderate-milking cows.

Table 15. BREED OF COWS FROM THREE MILK GROUPS (Nebraska, 1990)

Milk production	Breeds
Low	Hereford x Angus
Medium	Red Poll x Angus
High	Shorthorn x Angus

Table 16. MILK PRODUCTION - THREE MILK GROUPS (Nebraska, 1990)

	Milk group		
Cow age at calving	Low	Medium	High
	---------- lb/205 days ----------		
2	2180	2990	3330
3	2705	3455	3815
4+	2830	3600	4140

Table 17. WEANING WEIGHTS - THREE MILK GROUPS (Nebraska, 1990)

	Milk group		
Cow age at calving	Low	Medium	High
2	439	472	494
3	489	509	529
4+	536	540	571

Table 18. MAINTENANCE REQUIREMENTS - THREE MILK GROUPS (Nebraska, 1990)

	Milk group		
	Low	Medium	High
Mature cows			
Gestation	97	114	110
Lactation	126	148	41
Growing cattle			
Backcrosses	132	145	150
Charcoals crosses	144	157	164

Data are Kcal/kg metabolic body weight/day.

Management

An important means to increase weaning weights other than changing genetics, is to alter the calving pattern, so that more calves are born early within the calving season, since older calves, obviously weigh more at weaning.

Table 19. EFFECT OF CALVING DATE ON WEANING WEIGHT (Wyoming data)

Calving month	Weaning age, d	WW, lb	lb lost
First month	210	450	---
Second month	180	400	50
Third month	150	340	110

Table 20. EFFECT OF CALVING DATE ON PREGNANCY (90-d SEASON)

Calving month this year	First	Second	Third
Pregnant this year, %	96	90	83
Calving next year:			
first month	72	54	20
second month	18	27	46
third month	6	9	17
Estimated calf wt next yr, lb	416	382	332
Calf wt lost next yr, lb	34	84	

Growth-promoting implants

As data in Table 21 indicate, implanting calves at birth results in substantial increases in growth, and high returns per dollar invested. Since some implants can be used at birth, the labor required is virtually zero. If cattle will be retained and fed to slaughter, effects of subsequent implants will be additive, the value of the implant at birth is not lost. Implanting heifer calves may cause earlier puberty, due to increased weight gain. Some researchers have reported reduced reproductive performance in implanted heifer calves, while others have observed no difference between implanted and non-implanted heifers. The author's recommendation is that all steer calves and the half of the heifer calves that were born latest should be implanted, the earliest heifers should not, unless it has been decided that none will be kept as replacements. Even if implants do not affect reproductive performance, the oldest heifers in a calf crop, if fed properly, should have no trouble reaching puberty early enough to breed on time and do not need the added growth provided by an implant. Implanting bulls that will be used for breeding is not recommended.

Table 21. ECONOMICS OF IMPLANTING SUCKLING CALVES

Cost of implant(s) + labor, $	=	2.50
200-day gain response, lb	=	15-45
Added value @ $.65/lb	=	9.75 to 29.25
Added value @ $.95/lb	=	14.25 to 42.75
Net return/$1 invested	=	3.90 to 17.10

Parasite control

Annual de-worming of the cow herd has been shown to be beneficial in most parts of the country. Reports of research indicate improvement in calf weights of from 8 to 26 lb per head, a single study has reported 50 lb increases in weaning weight. Controlling flies can also be beneficial.

USE OF INSECTICIDE EAR TAGS

* Dozens of studies
* One or two tags/cow or calf
* Response from 5 to 66 lb/calf
* Average 15 lb/calf in Northern states
* Resistance may become a problem
* Remove old tags each year, rotate brands

IV. Increasing Price Per Pound of Calf Sold.

Research at Kansas State University describes many of the factors that affect sale price of feeder calves. While any feeder calf sale is a unique event, these data can be applied to the North Central region of the U.S.

Condition, frame size, breed and previous management are some of the factors involved. In the KSU work, a survey of sale barns that included several thousand feeder calves presenting calves for sale in either very thin or fat condition substantially reduced sale price (Table 22). Calves described as "fleshy" were discounted slightly in comparison to those in thin or average condition.

Small framed calves were discriminated against, in comparison to medium or large framed calves (Table 23). Continental and British crossbred calves sold for higher prices than straightbred calves (Table 24).

Table 22. EFFECT OF CONDITION ON SALE PRICE OF STEER CALVES, KANSAS

Condition	Average price, $/cwt
Very thin	55.11
Thin	64.26
Average	64.07
Fleshy	62.48
Fat	57.50

Lambert, et al., 1983.

Table 23. FEEDER CALF PRICE BY FRAME SIZE, KANSAS

Frame size	Average price, $/cwt
Large	65.13
Medium	64.21
Small	57.69

Lambert, et al., 1983.

Other management practices affect sale price of feeder calves. Castrated male calves typically bring $5 to 15/cwt more bull calves, especially if the castration wounds have healed. Dehorned and healed (or polled) calves often bring $2 to 5/cwt more than horned calves. Together, these practices will add approximately $50 per head at sale time. The value of pre-vaccination programs is less well defined. In many instances, calves vaccinated against IBR, PI3, and hemophilus somnus will bring a $1 or 2/cwt premium over those not vaccinated. Vaccination against clostridial diseases such as blackleg, malignant edema and enterotoxaemia may be warranted in some parts of the country. While most buyers prefer to

buy calves that have "had all their shots", not all are willing to pay a premium for the privilege. Buyers also may prefer pre-weaned (for 30 days) calves that are over post-weaning stresses, but few will pay extra so this practice is often not profitable.

Table 24. EFFECT OF BREED OR BREED CROSS ON SALE PRICE OF STEER CALVES, KANSAS

Breed	Average price, $/cwt
Simmental & crosses	65.47
Charolais & crosses	65.20
Black baldies	64.73
Herefords	64.06
Brahman & crosses	62.35
Angus	60.37

Lambert, et al., 1983.

Sorting calves from large herds or pooling calves from small herds to make uniform groups for sale can dramatically increase price received per pound. Reports from cattlemen in northern and central Minnesota suggest that grouping cattle to make loads similar in breed and weight can bring a premium (or avoid a discount) of as much as $7/cwt. Owners of small cow herds should definitely consider this marketing strategy.

Retained ownership

Cow/calf producers should consider retained ownership of their calves if they have feed, facilities and financial resources to make it possible. Analysis of records from the Kansas Steer Futurity has shown that between 1974 and 1983, retaining ownership would have yielded $34 higher net returns than if calves had been sold at weaning (+$31 vs -$3/calf). Selling calves at weaning was profitable 3 of 9 years, feeding calves was profitable 5 of 9 years. The most profitable cattle to feed were those that could gain rapidly **and** grade over 50% choice. While retained ownership is a poor choice some years, it should be considered every year.

V. Reducing Annual Cost of Maintaining Cows.

Reduce feed cost

A summary of high vs low cost producers in the Nebraska Integrated Resource Management (IRM) program offers insight as to the importance of lowering costs. Low cost producers required $88.74 less per calf weaned, yet weaned heavier calves than high cost producers. This resulted in a $.20 reduction in cost per pound of calf produced.

Low cost producers had almost $45/cow less feed cost than high cost producers, more than half of the total difference in cost of production between the two groups. As stated before, a dry cow in mid-gestation can be fed low cost feedstuffs and maintained quite cheaply, while still meeting her nutrient requirements, which are low during that period. One of the keys to this is maximum use of crop residues. Producers in most areas of Minnesota have access to corn stalk residue or straw from small grains. Crop residues, especially corn stalks can be grazed at minimal cost. Producers who do not have stalk residue should consider leasing it from neighbors. If hay is priced at $40 to 80/T, a fair price for leased stalks would be

$9 to 16/cow/month. Stalks can also be harvested as stacks or large, round bales. Harvested stalks are worth $18 to 37/T of DM. If cows are in adequate condition, feedstuffs such as corn stalks should be considered during late fall and early winter, thin cows should receive higher quality feed.

When considering any purchased feedstuffs, cost per pound of energy (TDN) should be evaluated in order to make purchase decisions. Be aware that many by-product feeds have extremely low DM content, some are so low that even if they are free, the transportation cost may be too high for them to be the proper choice.

Table 25. HIGH vs LOW COST PRODUCERS, NEBRASKA

Item	Low cost producers	High cost producers
	-------- Feed costs, $/calf weaned --------	
Alfalfa hay	25.75	51.58
Other hay	33.07	31.69
Silage	1.86	18.81
Total harvested	60.68	102.08
Other	92.76	96.28
Total	**153.44**	**198.36**
	-------- Total costs, $/calf weaned --------	
Total feed costs	153.44	198.36
Other operating	77.77	105.42
Ownership costs	135.35	151.52
Total	366.56	455.30
	---------- Summary ----------	
Cost/calf weaned, $	366.56	455.30
Average weaning wt, lb	500	489.5
Cost, $/lb weaned	0.73	0.93

IRM cooperating herds 1990; average of 1987; 1988 data.

Table 26. PRICING FEEDSTUFFS BASED ON ENERGY (TDN) CONTENT

Feedstuff	Price, $/T	DM, %	Cost/T of DM	TDN, % in DM	Cost/T of TDN
Corn grain	90	85	125.88	91	116.35
Corn silage	24	32	75.00	70	107.14
Oats	120	88	136.36	75	181.82
Barley	85	88	96.59	83	116.37
Wheat	110	88	125.00	90	138.89
Corn screenings	80	85	94.12	80	117.65
Grain dust	65	88	73.86	80	92.33
Alfalfa hay	80	88	90.91	58	156.74
Wheat straw	50	88	56.82	43	132.14
Potato waste	16	20	80.00	78	102.56

Table 27. COST OF ENERGY (TDN) IN HAY AND CORN

Price	TDN cost, cents/lb	Energy-equivalent value of other feedstuff
Legume-grass hay, $/T	hay	corn, $/bu
20	2.1	0.91
40	4.1	1.78
60	6.2	2.69
80	8.3	3.57
100	10.3	4.46
120	12.4	5.37
Whole corn, $/bu	corn	hay, $/T
1.50	3.5	33.52
2.00	4.6	44.53
2.50	5.8	56.14
3.00	6.9	66.79
3.50	8.1	78.41
4.00	9.2	89.06

Assumptions: hay = 88% DM, 55% TDN in DM; corn = 85% DM, 91% TDN in DM.

Since the protein requirement of a cow in mid-gestation is quite low, most diets require little protein supplementation. All protein sources should be evaluated on a cost/lb of protein basis when purchase decisions are made.

A further means to reduce feed cost/cow is to feed Rumensin, which was recently approved for use in breeding females. Use of Rumensin can reduce cow costs and can increase growth in replacement heifers, which will cause them to cycle earlier. Some guidelines:

RUMENSIN FOR BREEDING FEMALES

1. Cleared for feeding to breeding females
2. Suggested feeding level:
   a. 200 mg/head/day or
   b. 400 mg/head/every other day
3. Heifers will gain 0.2 lb/day faster and cycle 13-14 days earlier; cost, including carrier = $22.50 for 200 days
4. Cows will reduce intake of medium or higher quality forage by 6-10%
5. Do not use with poor quality forage

Cull open cows

In a commercial herd, there is virtually no reason to keep open cows, rather than culling them. Since cull cows are lowest in fall, there may be incentive to feed cows for 30 to 90 days after culling, to increase their weight and value. In some instances, thin cows can be expected to gain 3 or 4 lb/d for brief periods after

weaning, with very favorable feed conversion efficiency. Cows that are in good condition at weaning probably will gain very little after weaning and should be sold immediately.

Table 28. INCOME GAINED BY CULLING RATHER THAN KEEPING OPEN BUT OTHERWISE SOUND OPEN COWS (Nebraska, 1990)

$/100 cow herd

	Breeding season length, d		
First service conception	45	70	120
50%	4464	2259	927
60%	4161	1745	295
70%	2175	806	780
80%	1061	544	67

Use of artificial insemination (AI) may provide a means to obtain superior genetics at a reasonable cost. When deciding whether to utilize AI, producers should be aware that AI requires specific skills and increased labor. Research at the University of Nebraska has described the various economic considerations involved in this decision (Tables 29 through 31). In general, an AI sired pregnancy will cost a few more dollars than a natural sired pregnancy. If the AI calves will bring a premium, or daughters will make superior replacements, use of AI should be considered.

Table 29. ARTIFICIAL INSEMINATION COSTS (Nebraska, 1990)

Item	Cost per unit
Semen, $/straw	12.50
Prostaglandin F2a, $/dose	2.00
Synchromate-B, $/dose	6.00
Other cash costs[a], $/insemination	.13
Fixed costs, $/year	176.30

[a]Semen tank, carrying case, pipette gun, electric thaw box, liquid nitrogen.

Table 30. NATURAL SERVICE - ANNUAL COSTS PER BULL (Nebraska, 1990)

Feed costs, $	254.20
Other cash costs[a], $	70.00
Fixed costs[b,c], $	373.50
Total annual costs, $	697.75

[a]Veterinary services and medicine, labor, and building and equipment maintenance.
[b]Interest on bulls, death loss, depreciation and fixed cost of facilities.
[c]Bull purchase price = $1710, salvage value = $890. Twenty-five % of bulls replaced annually.

Table 31. BREEDING COST PER PREGNANT FEMALE, $ (Nebraska, 1990)

		Calving herd size		
System	AI preg rate	30	100	300
PGF2a, 1 inj	45	46.60	36.60	31.20
PGF2a, 2 inj heat detection	40	47.80	38.50	33.40
PGF2a, 2 inj timed breeding	38	51.50	43.50	41.30
SM-B heat detection	53	52.40	37.00	34.30
SM-B timed breeding	50	53.70	39.50	37.20
21 day AI	53	46.70	32.10	30.30
70 day AI	94	46.20	40.00	38.20
Natural service	--	42.30	32.00	30.00

Labor cost = $5.50/hour.

Why not:

Sell May/June calving cows and buy March calvers?
Sell top quality hay and buy medium quality hay?
Own/lease/trade/rotate bulls with your neighbors?
Pool feeder calves for sale?
Feed cull cows for 60 days before sale?
Coordinate fly tag programs?
Produce replacements for others?

Conclusion

Practices described should be considered by each cow/calf producer. Adoption of practices depends on a producers' situation, not all practices will result in increased profit in all situations. Nonetheless, thought should be given to each.