



Some Items to Consider Before You Change The Calving Season of Your Beef Cow Herd

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Introduction

One of the major production advantages of beef cattle is that they are a **polyestrus species**, which means that we can breed and calve them at about any time we choose. Lately we have all heard much about changing the calving season of our cow herds to better match the nutrient requirements of our cows with our most abundant and/or least expensive sources of forage. Many articles and testimonials on this subject are with regard to changing from **spring-calving to summer-calving**. Most spring-calving operations in the Intermountain West calve sometime between February through April. Due to weather conditions most operators must feed their cattle mechanically harvested forage such as hay during this period. By May most cow-calf operations will have some type of range or pasture available for the cattle to graze. Of course the major difference between the mechanically harvested forages and the grazed forages is **cost**. If considered on an equal-quality basis, mechanically harvested forages such as hay usually cost over twice that of forages directly grazed by cattle. **For example, if hay was valued at \$.0444/lb of dry matter (DM), grazed forage of equal quality would likely be valued at \$.0200/lb of DM.**

When a cow calves and begins to lactate her energy requirement increases compared to the last trimester of gestation. We often assume that most of this increase is due to the energy needed for milk synthesis. However, it is important to remember that this depends on how much milk the cow is capable of producing. If the cow is of average milking ability (10 lbs/day) the energy needed for milk synthesis is about the same as that needed for fetal development the last third of pregnancy. If a cow is of superior milking ability (20 lbs/day), obviously that will require much more energy than fetal

development during late gestation. However, respecting the energy requirements of cows there is a factor we often overlook. When a cow calves and begins to lactate her physiology changes drastically to accommodate milk synthesis. One of the side effects of this change is a major increase in the amount of maintenance energy required by the cows. Maintenance energy is basically the amount of energy needed to stay alive without any type of production: fetal development, milk synthesis, body weight increase, etc. Usually there is an 18 to 20% increase in energy required for maintenance after a cow calves and begins to lactate. For example, if a 1200 lb beef cow required **9.0 Mcal of Net Energy for Maintenance (NE_m)** during late gestation that same cow would require approximately 11.0 Mcal NE_m during lactation. So beef cows have a substantial increase in energy requirements after calving. Obviously it would be a major economic advantage to have the cows grazing pasture or rangeland during this period of high energy demand, instead of feeding hay that costs more than twice as much per unit of available energy.

On most cow-calf operations in the Intermountain West calving peaks in March and pasture or rangeland is not available for grazing until May. This means relatively expensive hay is being fed to cows that have a high energy requirement for about two months. By moving calving to May or June cows will be consuming a much less expensive feed source during this period of high energy demand. The objective of the following exercise was to illustrate the thought processes that should be considered before changing the season of calving of a beef cow herd. There are more items to consider than just the energy requirements of the cows and the least expensive method of meeting those requirements. It's quite easy to change from a spring-calving to a summer-

calving beef cow herd. Just put the bulls in a little later. But it's much more difficult, complicated, and costly to change back. A couple of other items that must be considered are how the calves will be managed and marketed, and the environmental conditions that will exist during the breeding season.

Material and Methods

For this exercise four tables (Tables 1, 2, 3, 4) have been developed that illustrate the energy (NE_m) requirements of beef cows and their suckling calves for each month in a yearly production cycle. The following are a few of the assumptions used in the development of the tables. Keep in mind that most cow-calf operations have a different set of resources and management restrictions. Those selected in these examples are for purposes of illustration.

- Table 1 depicts the energy (NE_m) requirements of mature spring-calving beef cows and their gestating and suckling calves for each month of a yearly production cycle.
 1. Energy requirements have been segregated into the various purposes for which energy is used; i.e., body maintenance, fetal development, milk synthesis, body tissue gain, etc. This helps illustrate for what purpose the majority of the cattle's daily energy intake is being used during different periods of the yearly production cycle.
 2. In this example the majority of the spring-calving cows calve **March through April**, which means the majority of the cows are bred June through July.
 3. The cows are assumed to weigh about **1250 lbs** when in average body condition (BCS 5-6) and in the very early stages of the gestational period.
 4. The calves are assumed to be **weaned at 220 to 240 days of age** near the end of October at about **550 lbs**. The calves are assumed to be marketed at weaning.
 5. It is also assumed that pasture is available May through October and that the cattle graze haycrop aftermath during November. The energy (NE_m) content of the pasture forage was assumed to be high at the beginning of the grazing season (**.66 Mcal NE_m /lb DM in May**), but gradually decreases as the grazing season proceeds (**.58 Mcal NE_m /lb DM in October**). This is the normal situation on many pastures and rangelands. However, if management intensive grazing practices are being used on improved, irrigated pastures, the energy content of the forage may remain high for most of the grazing season. Also on some range allotments the cattle graze pastures in a circuit in which the elevation gradually increases. The energy content of the forages on such allotments can also remain fairly stable. The dollar value of the pasture forages was set at **\$.02/lb DM** through the entire grazing season. The same value was placed on the grazed haycrop aftermath ($\$20/AUM \div 1000 \text{ lbs DM/AUM} = \$.02/\text{lb DM}$).
- 6. Grass hay is available when pastures are not available, **December through April**. The hay is assumed to contain .55 Mcal NE_m /lb DM, which is roughly equivalent to 55% TDN on all-forage diets. This type of hay is fairly typical of that used to winter beef cows on cow-calf operations in the Intermountain West. The value of this hay was set at **\$.044/lb DM**, which is approximately **\$80/ton on an as-fed basis**. Of course the value of hay on different cow-calf operations varies greatly, but effort should be made to obtain an estimate that is as accurate as possible.
- 7. The daily energy requirements of the cows were determined by adding all of the partial requirements; i.e., maintenance + weather + fetal development + milk synthesis + physical activity + body tissue gain. The monthly energy requirement was then calculated by multiplying the daily requirement by the number of days in each month ($14.70 \text{ Mcal } NE_m/\text{day} \times 31 \text{ days/month} = 455 \text{ Mcal } NE_m/\text{month}$). Then the yearly energy requirement of the cows was calculated by adding each of the monthly requirements.
- 8. The estimate of the energy requirements of the calves was conducted in much the same way. However, just the energy needed from forage was calculated. The energy available from milk being consumed by the calves was subtracted from the total energy requirement for this purpose. It was assumed that the **average milk production of the cows was 15 lbs/day**. However, the amount of milk available to the calves was prorated following a normal beef cow lactation curve with milk production peaking about six weeks after calving and then gradually declining. Notice the line labeled " NE_m needed from forage" on Table 1. Also note that during the first two months after birth no energy from forage is necessary to meet the calf's energy requirement, although small amounts of forage are being consumed. It is also assumed that these calves are **gaining about 2.0 lbs/day**, and would thus wean at about **550 lbs at 220 to 240 days of age**. Regarding the energy needed for calf body weight gain, net energy for gain (NE_g) was mathematically adjusted to net energy for maintenance (NE_m) assuming an all-forage diet. This was done for simplicity.

9. By adding the monthly energy requirement of the cows with that of the calves, the monthly energy requirement of the cow-calf pair was estimated. Notice the line labeled “NE_m Required/Pair, Mcal/month.” By adding each of these monthly energy requirements, the yearly energy requirement of cow-calf pairs was calculated. This value is placed in right-hand margin of the tables.
10. Once the energy requirement of the cows or cow-calf pairs has been calculated the amount of the particular forage being used that month can be calculated by dividing total monthly energy requirement/pair/month by the energy content of the forage. For example during January on Table 1 the energy (NE_m) requirement of a spring-calving cow-calf pair was **455 Mcal**. In this case it's the dry, pregnant cow only because the calves were weaned and sold the end of October. During January hay is being fed that contain **.55 Mcal of NE_m/lb of DM**. So the dry, pregnant cow would require $(455 \div .55)$ **827 lbs of DM from hay** to meet her energy requirement. During the month of June the cow-calf pair requires 578 Mcal. During June the cow-calf pair is grazing pasture forage that contains .65 Mcal NE_m/lb DM, so the pair would require $(578 \div .65)$ **889 lbs of DM of grazed pasture forage**.
11. Lastly, once the amount of forage required each month is determined, the dollar value of those forages can be calculated for each month. During the month of January in Table 1 a dry, pregnant spring-calving beef cow requires **827 lbs of DM** from hay that is valued at **\$.044/lb DM**. So the forage cost for the month of January is $(827 \times .044)$ **\$36.39**. In June the same cow with her suckling calf will require **889 lbs of pasture forage DM** that is valued at **\$.02/lb DM**. So the forage cost for the month of June will be $(889 \times .02)$ **\$17.78/cow-calf pair**. By adding each of the monthly forage costs a good estimate of yearly forage cost can be calculated. From Table 1, with the assumptions stated above, the yearly forage cost of spring-calving cow-calf pairs is **\$332.47/pair/year**.
12. Keep in mind that **protein-vitamin-mineral supplementation** is not included in this value. Usually with reasonably good-quality forages, protein supplementation would be unnecessary and vitamin-mineral supplementation could be accomplished for less than \$21/pair/year. We assumed that this cost would not vary much relative to the season of calving, so it was not included in the yearly feed cost. But vitamin-mineral supplementation is necessary in almost all cases. Other bulletins are available on this Web site that provide more detail on this subject.
- The same assumptions are used with **Summer-Calving Cow-Calf pair in Table 2**. The major difference is that calving was adjusted to June through July, with breeding September through October. It was assumed that calves remained with the cows until January-February when they were weaned and marketed. Of course there are other marketing options for these summer-born calves. But for comparison purposes all calves associated with the example in this bulletin are marketed at weaning, which is 220 to 240 days of age. Note that the total yearly forage cost was slightly higher for the summer-calving versus the spring-calving scenarios (\$346.00 versus \$332.47), or about 3% higher. However, the value of the January-February weaned calves is likely to be more than that of the October-November weaned calves. That will be discussed in the next section.
 - **Table 3** uses the same set of assumptions except the estimates are made for **fall-calving cows that calve September through October** and are bred December through January. Calves are assumed to remain with their mothers until 220 to 240 days of age and are thus weaned and marketed during April-May. The value of these calves is discussed in the next section of this bulletin.
- The same set of assumptions is used in **Table 4 with winter-calving cows** that calve December through January and are thus bred March through April. Calves are assumed to be weaned and marketed July-August.

Table 1. Estimate of the yearly feed cost of **spring-calving cow-calf pairs** based on energy requirements of the cattle, energy content, and the dollar value of the forages.^a

Month	J	F	M	A	M	J	J	A	S	O	N	D	
Cow NE _m Requirement, Mcal													
Maintenance	9.0	9.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	9.0	9.0	
Weather	2.0	2.0	1.75	.75	.25	.50	.75	.75	1.0	1.25	1.50	2.0	
Fetal development	3.44	5.37	0	0	.01	.03	.07	.16	.32	.64	1.18	2.08	
Milk synthesis	0	0	4.8	5.7	5.2	4.1	3.1	2.2	1.1	1.0	0	0	
Physical activity	.25	.25	.25	.50	.50	.50	.50	.50	.50	.50	.50	.25	
Body tissue gain	0	0	0	0	0	0	0	0	0	0	0	0	
Total NE _m Mcal/cow/day	14.70	17.12	17.80	17.95	16.96	16.13	15.42	14.61	13.92	14.39	12.18	13.33	Total NE _m /cow/year
Total NE _m Mcal/cow/month	455	479	552	539	526	484	478	453	418	446	365	413	5608
Calf NE _m Requirement, Mcal													
Maintenance			1.14	1.75	2.27	2.76	3.23	3.67	4.10	4.51			
Weather			.13	.09	.04	.11	.20	.24	.37	.52			
Physical activity			.02	.06	.08	.11	.13	.16	.18	.21			
Body tissue gain			1.30	1.98	2.59	3.15	3.68	4.18	4.67	5.14			
Total NE _m Mcal/calf/day			2.59	3.88	4.98	6.13	7.24	8.25	9.32	10.38			Total
NE _m from milk			3.51	4.17	3.81	3.00	2.27	1.61	.81	.73			NE _m /pair/year
NE _m needed from forage			0	0	1.17	3.13	4.97	6.64	8.51	9.65			6652
NE _m Required/pair, Mcal/day	14.70	17.12	17.80	17.95	18.13	19.26	20.39	21.25	22.43	24.04	12.18	13.33	
NE _m Required/pair, Mcal/month	455	479	552	539	562	578	632	659	673	745	365	413	
Forage NE _m Mcal/lb. DM	.55	.55	.55	.55	.66	.65	.63	.61	.60	.85	.57	.55	
Forage Required, lbs. DM/pair/month	827	871	1004	980	852	889	1003	1080	1122	1285	640	751	
Value of Forage, \$/lb. DM	.044	.044	0.44	.044	.02	.02	.02	.02	.02	.02	.02	.044	
Forage Cost, \$/pair/month	36.29	38.32	44.18	43.12	17.04	17.78	20.06	21.60	22.44	25.70	12.80	33.04	Total Feed Cost
													\$/pair/year
													\$332.47

^aEstimates of the energy (NE_m) requirements of beef cattle in the table above are adapted from Nutrient Requirements of Beef Cattle (2000), National Research Council, Washington, D.C.

Table 2. Estimation of the yearly feed cost of **summer-calving cow-calf pairs** based on energy requirements of the cattle, energy content, and the dollar value of the forages.^a

Month	J	F	M	A	M	J	J	A	S	O	N	D	
Cow NE _m Requirement, Mcal													
Maintenance	11.0	9.0	9.0	9.0	9.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Weather	2.0	2.5	1.75	.75	.25	.50	.75	.75	1.0	1.25	1.50	2.0	
Fetal development	.64	1.18	2.08	3.44	5.37	0	0	.01	.03	.07	.16	.32	
Milk synthesis	1.0	0	0	0	0	4.8	5.8	5.2	4.1	3.1	2.2	1.1	
Physical activity	.25	.25	.25	.50	.50	.50	.50	.50	.50	.50	.50	.25	
Body tissue gain	0	0	0	0	0	0	0	0	0	0	0	0	
Total NE _m Mcal/cow/day	14.89	13.93	13.08	13.69	15.12	16.80	17.95	17.46	16.63	15.92	15.36	14.67	Total NE _m /cow/year
Total NE _m Mcal/cow/month	462	362	406	411	469	504	556	541	499	494	461	455	5620
Calf NE _m Requirement, Mcal													
Maintenance	4.51					1.14	1.75	2.27	2.76	3.23	3.67	4.10	
Weather	.833					.03	.09	.125	.217	.333	.475	.733	
Physical activity	.104					.033	.056	.083	.108	.133	.158	.092	
Body tissue gain	5.14					1.30	1.98	2.59	3.15	3.68	4.18	4.67	
Total NE _m Mcal/calf/day	10.59					2.50	3.88	5.07	6.24	7.38	8.48	9.60	Total
NE _m from milk	.73					3.51	4.17	3.81	3.00	2.27	1.61	.81	NE _m /pair/year
NE _m needed from forage	9.86					0	0	1.26	3.24	5.11	6.87	8.79	6697
NE _m Required/pair, Mcal/day	24.75	12.93	13.08	13.69	15.13	16.80	17.95	18.72	19.87	21.03	22.33	23.46	
NE _m Required/pair, Mcal/month	767	362	406	411	469	504	556	580	596	652	667	727	
Forage NE _m Mcal/lb. DM	.55	.55	.55	.55	.66	.65	.63	.61	.60	.85	.57	.55	
Forage Required, lbs. DM/pair/month	1395	658	738	747	711	775	883	951	994	1124	1170	1322	
Value of Forage, \$/lb. DM	.044	.044	.044	.044	.02	.02	.02	.02	.02	.02	.02	.044	
Forage Cost, \$/pair/month	61.38	28.95	32.47	32.87	14.22	15.50	17.66	19.02	19.88	22.48	23.40	58.17	Total Feed Cost
													\$/pair/year
													\$346.00

^aEstimates of the energy (NE_m) requirements of beef cattle in the table above are adapted from Nutrient Requirements of Beef Cattle (2000), National Research Council, Washington, D.C.

Table 3. Estimation of the yearly feed cost of fall-calving cow-calf pairs based on energy requirements of the cattle, energy content, and the dollar value of the forages.

Month	J	F	M	A	M	J	J	A	S	O	N	D	
Cow NE _m Requirement, Mcal	Breeding			Weaning					Calving			Breeding	
Maintenance	11.0	11.0	11.0	11.0	9.0	9.0	9.0	9.0	11.0	11.0	11.0	11.0	
Weather	2.0	2.5	1.75	.75	.25	.50	.75	.75	1.0	1.25	1.50	2.00	
Fetal development	.07	.16	.32	.64	1.18	2.08	3.44	5.37	0	0	.01	.03	
Milk synthesis	3.1	2.2	1.1	1.0	0	0	0	0	4.8	5.7	5.2	4.1	
Physical activity	.25	.25	.25	.50	.50	.50	.50	.50	.50	.50	.50	.25	
Body tissue gain	0	0	0	0	0	0	0	0	0	0	0	0	
Total NE _m Mcal/cow/day	16.42	16.11	14.42	13.89	10.93	12.08	13.69	15.62	17.30	18.45	18.21	17.38	Total NE _m /cow/year
Total NE _m Mcal/cow/month	509	451	447	417	339	362	424	484	519	572	546	539	5609
Calf NE _m Requirement, Mcal													
Maintenance	3.23	3.67	4.10	4.51					1.14	1.75	2.27	2.76	
Weather	.53	.79	.64	.31					.07	.15	.25	.43	
Physical activity	.07	.08	.09	.21					.03	.06	.08	.05	
Body tissue gain	3.68	4.18	4.67	5.14					1.30	1.98	2.59	3.15	
Total NE _m Mcal/calf/day	7.51	8.72	9.50	10.17					2.54	3.94	5.19	6.39	
NE _m from milk	2.27	1.61	.81	.73					3.51	4.17	3.81	3.00	Total NE _m /pair/year
NE _m needed from forage	5.24	7.11	8.69	9.44					0	0	1.38	3.39	6669
NE _m Required/pair, Mcal/day	21.66	23.22	23.11	23.33	10.93	12.08	13.69	15.62	17.30	18.45	19.59	20.77	
NE _m Required/pair, Mcal/month	671	650	716	700	339	362	424	484	519	572	588	644	
Forage NE _m Mcal/lb. DM	.55	.55	.55	.55	.66	.65	.63	.61	.60	.58	.57	.55	
Forage Required, lbs. DM/pair/month	1220	1182	1303	1273	514	557	673	793	865	986	1031	1171	
Value of Forage, \$/lb. DM	.044	.044	.044	.044	.02	.02	.02	.02	.02	.02	.02	.044	
Forage Cost, \$/pair/month	53.68	52.01	57.33	56.01	10.28	11.14	13.46	15.86	17.30	19.72	20.62	51.52	Total Feed Cost \$/pair/year \$378.93

^aEstimates of the energy (NE_m) requirements of beef cattle in the table above are adapted from Nutrient Requirements of Beef Cattle (2000), National Research Council, Washington, D.C.

Table 4. Estimation of the yearly feed cost of winter-calving cow-calf pairs based on energy requirements of the cattle, energy content, and the dollar value of the forages.

Month	J	F	M	A	M	J	J	A	S	O	N	D	
Cow NE _m Requirement, Mcal	Calving		Breeding				Weaning					Calving	
Maintenance	11.0	11.0	11.0	11.0	11.0	11.0	11.0	9.0	9.0	9.0	9.0	11.0	
Weather	2.0	2.5	1.75	.75	.25	.50	.75	.75	1.0	1.25	1.50	2.00	
Fetal development	0	.01	.03	.07	.16	.32	.64	1.18	2.08	3.44	5.37	0	
Milk synthesis	5.7	5.2	4.1	3.1	2.2	1.1	1.0	0	0	0	0	4.8	
Physical activity	.25	.25	.25	.50	.50	.50	.50	.50	.50	.50	.50	.25	
Body tissue gain	0	0	0	0	0	0	0	0	0	0	0	0	
Total NE _m Mcal/cow/day	18.95	18.96	17.13	15.42	14.11	13.42	13.89	11.43	12.58	14.19	16.37	18.05	Total NE _m /cow/year
Total NE _m Mcal/cow/month	588	531	531	463	437	403	431	354	377	440	491	560	5606
Calf NE _m Requirement, Mcal													
Maintenance	1.75	2.27	2.76	3.23	3.67	4.10	4.51					1.14	
Weather	.23	.42	.38	.20	.08	.18	.31					.14	
Physical activity	.03	.04	.05	.13	.16	.18	.21					.02	
Body tissue gain	1.98	2.59	3.15	3.68	4.18	4.67	5.14					1.30	
Total NE _m Mcal/calf/day	3.99	5.32	6.34	7.24	8.09	9.13	10.17					2.60	Total NE _m /pair/year
NE _m from milk	4.17	3.81	3.00	2.27	1.61	.81	.73					3.51	6635
NE _m needed from forage	0	1.51	3.34	4.97	6.48	8.32	9.44					0	
NE _m Required/pair, Mcal/day	18.95	20.47	20.47	20.39	20.59	21.74	23.33	11.43	12.58	14.19	16.37	18.05	
NE _m Required/pair, Mcal/month	588	573	635	612	638	644	723	354	377	440	491	560	
Forage NE _m Mcal/lb. DM	.55	.55	.55	.55	.66	.65	.63	.61	.60	.58	.57	.55	
Forage Required, lbs. DM/pair/month	1069	1069	1155	1113	967	991	1148	580	628	759	861	1018	
Value of Forage, \$/lb. DM	.044	.044	.044	.044	.02	.02	.02	.02	.02	.02	.02	.044	
Forage Cost, \$/pair/month	47.04	45.85	50.82	48.97	19.34	19.82	22.96	11.60	12.56	15.18	17.22	44.79	Total Feed Cost \$/pair/year \$356.15

^aEstimates of the energy (NE_m) requirements of beef cattle in the table above are adapted from Nutrient Requirements of Beef Cattle (2000), National Research Council, Washington, D.C.

Implications

Using information summarized in Tables 1, 2, 3, and 4 the total yearly energy (NE_m) requirement, the total yearly forage

cost, the yearly forage cost associated with hay, and the yearly forage cost associated with pasture can be calculated for beef cows calving in the spring, or summer, or fall, or winter.

Table 5. Summary of yearly NE_m requirements, total yearly forage cost, forage cost during hay feeding period, and forage cost during the pasture grazing period for cows calving in either spring, summer, fall, or winter.

Calving Period	Yearly NE _m Requirement, Mcal	Yearly Total Forage Cost, \$	Forage Cost From Hay, \$	Forage Cost From Pasture, \$
Spring	6652	332.47	195.05	137.42
Summer	6697	346.00	213.84	132.16
Fall	6669	378.93	270.55	108.38
Winter	6635	356.15	237.47	118.68

1. The amounts of total yearly energy (NE_m) required were quite similar regardless of calving season. The highest was associated with the summer-calving and the lowest was associated with winter-calving. However, the difference was less than one percentage point.
2. The highest total yearly forage cost was associated with the Fall-Calving scenario, which was due to the high cost of forage from hay as a lactating cow and a growing calf are fed relatively expensive forage during the winter months with a high energy demand. Forage cost was 12.3 percentage points higher for the Fall-Calving system compared to the Spring-Calving system (\$378.93 versus \$332.47).
3. With the Fall-Calving scenario, hay accounted for 71.4% of the total yearly forage. However, with the Spring-Calving system hay accounted for only 48.7% of the total yearly forage cost, keeping in mind that hay cost is over twice that of grazed forage in this example.
4. The lowest total yearly forage cost was associated with the Spring-Calving system followed closely by the Summer-Calving system. There was only 3.9 percentage point difference between these two calving periods.
5. The Winter-Calving scenario resulted in forage costs intermediate between the Spring and Summer-Calving systems and the Fall-Calving system. The Winter-Calving system resulted in a 6.6 percentage point higher yearly forage cost compared to the Spring-Calving system (\$356.15 versus \$332.47).

Tables like 1, 2, 3, and 4 reveal an important fact about the energetics of the cow-calf industry in general. By adding the energy needed for milk synthesis, that needed for fetal development, and the energy needed from forage by the calves it is possible to calculate what proportion of the total yearly energy budget of a cow-calf pair that is used for the development of a weaned calf.

As an example, the following energy requirements for spring-calving cows was gleaned from Table 1:

Gestation	395 Mcal NE _m
Milk Synthesis	832 Mcal NE _m
<u>Forage (calf)</u>	<u>1037 Mcal NE_m</u>
	2264 Mcal NE _m

This is the total energy required for the development of a weaned calf.

2264 Mcal NE_m for weaned calf development ÷ 6652 Total Mcal NE_m needed (x 100) = **34.04%** per cow-calf pair/year. Energy costs for gestation (fetal development) and milk synthesis would not be affected by the season when calving takes place, but could affect amount of forage needed by the calves:

Summer calves :	1049 Mcal NE _m
Fall calves :	1061 Mcal NE _m
Winter calves :	1038 Mcal NE _m

Note that although there are differences the magnitude is minimal.

About 5.94% is needed for fetal development. Milk synthesis requires 12.51% of the energy budget and the remaining 15.59% is from forage consumed by the calf. **Hence 65.96% of the total yearly energy budget for a cow-calf pair is for the maintenance of the cow.** This high maintenance energy demand is one of the major challenges to the profitability of the beef cow-calf industry.

So although the total yearly energy budget of cow-calf pairs varies little as a result of the time of year that calving takes place, the cost of that energy can vary as much as 12.3% (spring-calving versus fall-calving). In addition, the value of calves weaned and marketed at different times of the year can vary greatly. Since most of the cow-calf producers in the U.S. calve in the spring and wean and market in the fall, the value of fall-weaned calves is historically at its lowest. Consequently

it is important that an estimate of the profit or loss associated with each of the calving and weaning times presented in this bulletin be estimated. The following are the steps we usually follow when making an estimate of the profit or loss of cow-calf operations:

1. Calculate the **Breakeven Price Required for weaned calves.**

- a. Estimate the **Annual Cow Cost**. The annual cow cost is a single cow's share of all production costs including feed, which accounts for the largest portion, replacement heifer costs, bull/breeding costs, labor, utilities, depreciation, repairs, etc.
- b. Estimate or measure the **Weaning or Sale Weight of the calves**. In this example the energy intake of the calves is indicative of a 550 lb weaning weight no matter the time of calving.
- c. Estimate or measure the **Weaning Percentage of the cows**. The weaning percentage of the cows is the percent of the cow herd placed with bulls or in a breeding program that actually wean a calf. Low weaning percentages are usually due to failure to conceive or conceiving too late.
- d. Breakeven Price needed for calves =

$$\frac{\text{\$Annual Cow Cost}}{\text{Weaning Weight, lbs x Weaning Percentage}}$$

2. Using the breakeven price of calves, calculate the **Ranch Value of the calves.**

$$\text{Ranch Value, \$/calf} = \text{Weaning Weight of Calves x Breakeven Price need for calves, \$/lb.}$$

The Ranch Value is a breakeven value, but on a \$/calf basis rather than \$/lb of calf basis.

3. Estimate the **Market Value of the calves**. In this bulletin calves could be weaned and marketed at four different times of the year:

Calving Period	Weaning and Marketing Period
Spring	End of October
Summer	End of January
Fall	End of April
Winter	End of July

The market value of calves weaned and marketed at these different times of the year will obviously vary. Normally the October weaned calves would be of lowest value and the March-weaned calves would be of the highest value due to supply and demand. The following are 10-year averages of the market value of weaning calves marketed at these different periods (Salina, Utah):

Calving Period	Market Value of 550 lbs Weaned Calves, \$/lb
Spring	\$1.08
Summer	\$1.06
Fall	\$1.13
Winter	\$1.13

These market values are of course for a local market in Utah. It is extremely important to obtain accurate market value estimates from the market you intend to use.

With this information it is possible to estimate the Profit/Loss that may be associated with the four calving periods being illustrated in this bulletin.

- Estimate Profit/Loss of the Spring-Calving System:
 1. Tables 1, 2, 3, and 4 give a good estimate of the total yearly feed cost that will be the major portion of the Annual Cow Cost. However, we will have to make an estimate of the **non-feed cost** associated with the annual cow cost. This will include labor, depreciation, repairs, replacement heifer costs, bull/breeding costs, taxes, etc. For this example we'll be using a non-feed cost of **\$155.65/cow/year**, which is average for cow-calf producers in Utah at this time (Utah Ag Statistics). We will assume for the examples in this publication that the time of year calving takes place does not affect the non-feed costs. However, it is not difficult to surmise that there actually may be difference. For example the labor cost associated with summer or fall calving may be less than that required for winter or spring calving simply due to weather conditions.
 2. In the following table the yearly forage cost associated with each calving season have been used to calculate an Annual Cows Cost (Tables 1, 2, 3, and 4). A total yearly non-feed cost of \$155.65/cow is used with all calving scenarios. In addition a \$21/cow-calf pair/year charge was added for vitamin-mineral supplementation.

Calving Period	Annual Forage Cost \$/pair/year	Vitamin-Mineral Suppl. \$/pair/year	Non-Feed Cost, \$/pair/year	Annual Cow Cost \$/pair/year
Spring	332.47	21.00	155.65	509.12
Summer	346.00	21.00	155.65	522.65
Fall	378.93	21.00	155.65	565.58
Winter	356.15	21.00	155.65	532.80

- Estimate the weaning weight or sale weight of the calves.** In this bulletin energy requirement calculations were conducted in such a way that no matter the calving season the calves would receive adequate energy such that an average daily gain of approximately 2.0 lbs/day would be maintained, which would result in 550 lb weaning calves for sale. Harsher weather, etc., have been accounted in the NE_m requirements. However, if energy intake of the calves was affected due to season of calving, weaning/sale weight would definitely be affected. It is assumed that the genetic potential for body weight gain is similar in the calves.
- Estimate the weaning percentage of the cows.** Even though cows and calves are calculated to be consuming adequate amounts of energy regardless of the season of calving, one could contemplate difference in weaning percentage being associated with the season of calving. For example some who have changed from a spring to a summer calving system have reported a reduction in weaning percentage, likely due to

decreased bull fertility as a result of hotter weather during August and September versus June and July. Day length may also be affecting bull and cow fertility even with adequate nutrition. Calving in the spring and winter may result in higher loss of calves at or near calving due to inclement weather conditions. The following are the weaning percentages used in this bulletin. One may be able to obtain more accurate estimates by consulting local veterinarians or extension specialists.

Calving Period	Cow Weaning Percentage
Spring	85%
Summer	88%
Fall	88%
Winter	82%

- Estimation of the Profit or Loss** associated with calving cows either spring, or summer, or fall, or winter and weaning and marketing calves at about 240 days of age:

Calving Period	Annual Cow Cost, \$	Calf Weaning Weight, lbs	Cow Weaning %	Breakeven Price needed for calves, \$/lb	Ranch Value of calves, \$/calf	Market Value of calves, \$/calf	Profit or Loss \$/cow-calf/year
Spring	509.12	550	85	1.0890 ^a	598.95 ^e	594.00 ^f	-4.95 ^j
Summer	522.65	550	88	1.0799 ^b	593.95	583.00 ^g	-10.95
Fall	565.58	550	88	1.1686 ^c	642.73	621.50 ^h	-21.23
Winter	532.80	550	82	1.1814 ^d	649.77	621.50 ⁱ	-28.27

$$^a \frac{\$509.12}{550 \times .85} = \$1.0890/\text{lb}$$

$$^b \frac{\$522.65}{550 \times .88} = \$1.0799/\text{lb}$$

$$^c \frac{\$565.58}{550 \times .88} = \$1.169/\text{lb}$$

$$^d \frac{\$532.80}{550 \times .82} = \$1.1814/\text{lb}$$

$$^e 550 \text{ lbs} \times \$1.0890 = 598.95$$

$$^f 550 \text{ lbs} \times \$1.08/\text{lb} = 594.00$$

$$^g 550 \text{ lbs} \times \$1.06/\text{lb} = 583.00$$

$$^h 550 \text{ lbs} \times \$1.13/\text{lb} = 621.50$$

$$^i 550 \text{ lbs} \times \$1.13/\text{lb} = 621.50$$

$$^j 594.00 - 598.95 = -4.95$$

Conclusions

- With the assumptions and restrictions associated with the examples used in this bulletin all calving season scenarios were unprofitable, which is not an uncommon situation in the beef cow industry.
- Changing the calving season from spring would not be advisable** with the assumptions and restrictions associated with the examples used in this bulletin.
- This does not mean that moving the calving season is always unadvisable.** With a different set of restrictions and assumptions a change in calving season may indeed be warranted. For example, if the price differential between the hay and the pasture was wider, conclusions would likely change.
- The major point we are trying to make with this bulletin is that it is better to follow the**

decision-making procedures described in this bulletin to help you determine if a change in the calving season would increase profitability.

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