Coping With A Short Forage Supply

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Producers across much of Indiana are faced with less than ideal forage supplies. The Easter weekend freeze this past spring damaged many forage crops, especially legumes, and dramatically reduced early season yields. Depending on location in the state and previous stress to the forage, first cutting hay yields were reduced 30-70%. Dry weather in May and June provided another stress and set the stage for poor regrowth of hay and pasture. At this point, rain will provide some relief, but the hot temperatures typically associated with July and August are not conducive to significant growth of cool-season grasses such as tall fescue, orchardgrass and Kentucky bluegrass.

Hay supplies across the region are in short supply, and if hay can be found, it is expensive. In addition, many producers are concerned that they will not have enough hay made at the end of the season to meet their winter feed needs. Some producers have considered supplementing cows on droughty pastures with hay to maintain cow weight and support lactation. This is a short term fix to a much longer term problem. When forage supplies are limited, producers must decide how to best utilize their feed resources. If late winter- and spring-born calves are weaned at a traditional time of early fall, the cows will be thinner and the calves will be lighter. If cows enter the winter in thin body condition, additional feed will be needed for them to regain weight and body condition to minimize risking longer postpartum intervals and lower pregnancy rates next year. Unfortunately, there are no cheap, easy fixes for producers that have both short pastures and limited hay supplies. What are the alternatives and consequences?

Top 10 areas for consideration:

1) Rotationally graze pastures.
2) Summer annuals.
3) Cull and sell cows.
4) Plan for alternative feeding strategies using some combination of by-product feeds.
5) Minimize hay waste.
6) Limit feeding.
7) Utilization of crop residues and stock piled forages.
8) Drought stressed corn for grazing, green chop or silage.
9) Creep feeding calves to obtain near normal weaning weights.
10) Early wean calves to take pressure off of both the cows and the pastures.

Rotational grazing. Forage plants need a rest between grazing cycles to replenish carbohydrate reserves in their roots that will allow the plant to regrow. Without rest, plants will weaken and regrowth will be delayed. Continuously over-grazed pastures typically have lost many of the desirable forage species and they have been replaced by weeds and less productive species. During a drought, this result will be magnified. The old recommendation of graze half and leave half is still good advice. The problem this summer is that regrowth has been limited in pastures, even when they have been rested for 30 to 45 days between grazing cycles. Ideally, cattle should be moved when pasture plants are grazed to about a 4-inch stubble height. This will allow enough leaf material for photosynthesis to occur and the plant to begin the process of regrowth when environmental

conditions improve. Before all pastures are grazed to a 4-inch stubble height and no regrowth has occurred, designate a sacrifice area within the pasture with temporary fence and provide alternative feeds to minimize long term damage to the whole pasture; this will allow a shorter recovery time on the non-sacrificed area of the pasture when the environmental conditions improve.

Annuals. Annual warm-season grasses such as sudangrass, sorghum-sudangrass and pearl millet are popular choices for picking up the summer slump, but soil moisture is needed for them to germinate and grow. Availability of these warm-season annual grass seeds are, unfortunately, very limited in 2007 and may be difficult to find. If these grasses are not sown before late July it is unlikely that the resulting value of the growth will exceed costs of production. Another option would be to seed spring oat in mid-August. If the forage is to be grazed, the addition of forage turnip with the oat could be an alternative. Wheat acreage harvested for grain provides an opportunity for establishing these grasses, if that acreage has not been planted to double crop soybean. Even though pearl millet will yield somewhat less tonnage, it has one significant advantage over sudangrass and sorghum-sudangrass. If germination is delayed due to lack of moisture, pearl millet can be grazed longer into the fall without the concern of prussic acid poisoning.

Cull cows. Now would be a great time to consider selling cows that lost their calf,, open cows, old cows, unsound cows (arthritic, stifled, blind in one or both eyes, etc.), cows with cancer eye, and tail-end performing cows that have a history of weaning lightweight calves. Pregnancy checking cows can be accomplished by most large animal veterinarians on cows that are at least 35-days pregnant. If the calving/breeding season was long and it is desirable to tighten that up some, consider selling the late calving cows (regardless of pregnancy status, with or without calf at side) and pregnancy checking only the cows that calved early. For example, if a 60-75-day calving season is desired next year, pregnancy checking could take place 95-110 days after the breeding season started. A sound management strategy this year will be to only feed cows through the winter that are diagnosed pregnant. Selling cows in August and early September may net more dollars than waiting until later in the fall. Historically, cull cow prices take a dip in October and November when the cow market is flooded by many herds following weaning of their late winter and spring-born calves.

Plan for alternative feed use. Several counties in the state have already had Conservation Reserve Program acres released for making hay and more may follow. At this point in the season, forage quality coming off of these acres will be low, but it is a resource that can be utilized. If the current growth can be harvested soon, there is a possibility that a second, higher quality cutting could be made later.

Crop residues such as wheat straw and corn stover are resources that should be considered. For producers that have access to wheat straw, this could provide some quick relief to short pastures. Corn stover, on the other hand, will not be available until later this fall, but can provide some relief during the winter feeding period. Neither of these crop residues are a direct substitute for high quality pasture or hay, but if properly supplemented, cow requirements can be satisfied. Two different feeding strategies can be considered.

The first feeding strategy is to use crop residues as a roughage resource supplemented with byproducts. Since crop residues and other low quality, mature forages are characteristically low in protein (typically 4-5% Crude Protein) and energy (45-50% Total Digestible Nutrients), corn byproducts (such as corn gluten feed and distiller's grains),

become attractive sources of both energy and protein. For comparison, the CP requirement of beef cows is about 8% during gestation and 12% during lactation, while the TDN requirement is about 53% and 63%, respectively. On a dry matter basis, corn gluten feed contains about 23% CP and 80% TDN, and distiller's grains plus solubles contain about 28% CP and 88% TDN. Feeding of corn byproducts to cows, however, should not be done without caution. Over-feeding of these byproducts can result in excessive amounts of fat (which can affect rumen fermentation), sulfur (which can bind with copper and cause a copper deficiency), and nitrogen (which could lower fertility and reduce embryo survival). Sample rations are shown in Table 1 that can be used safely with cows.

Table 1. Sample dry, mid gestation cow rations (lb/day as-fed basis[a)] .

Ingredient[b]	**Ration 1**	**Ration 2**	**Ration 3**	**Ration 4**
Wheat straw	free choice	free choice		
Corn stover			free choice	free choice
Dry corn gluten feed	9		6	
Dry distiller's grains		7.5		5
Limestone	.30	.20	.20	.10
TM salt	.20	.20	.20	.20
Magnesium oxide			.05	.05
Vitamin A	30,000 IU/d	30,000 IU/d	30,000 IU/d	30,000 IU/d

[a] Assumes a 1250 lb non-lactating, crossbred cow, 4-6 mo. pregnant, gaining .4-.5 lb/d.
[b] Ingredients within ration are listed as lb/d on an as-fed basis.

A second feeding strategy is treating these low quality forages with anhydrous ammonia to increase the protein content, improve forage digestibility, increase forage intake, and improve cow performance. This strategy is less attractive than the first because of anhydrous ammonia cost and the risks associated with its application. Research conducted at Purdue has shown that the addition of anhydrous ammonia to large round bales of crop residues at the rate of 3% of the forage dry matter will increased the crude protein content (6-8 percentage points) and dry matter digestibility (over 10% in corn stover and over 25% in wheat straw). In those studies, supplements were formulated to meet cow requirements for protein, vitamins and minerals for 90-day feeding trials during late gestation. Cows receiving the anhydrous ammonia treated residues (+ corn supplement) consumed 23-30% more dry matter and were over 60 lb heavier than cows fed non-treated residues (+ soybean meal supplement). Condition score change followed the same pattern as weight change.

Minimizing hay waste. Results from several Purdue studies with dry, gestating beef cows suggest that moderate quality orchardgrass-alfalfa hay supplies can be stretched by limiting cow access time to large round bales. In those 90 day, late gestation studies, cows were allowed 4-, 8-, 12-, and 24-hour access time per day to large round bales fed in a hay feeder. Feeder space was adequate to allow all cows in each treatment simultaneous access to hay. Cow weight change and body condition score change were not significantly affected by length of access time. Average cow weight gain on the 12 and 24 hour treatment were similar at approximately 58 lb. Weight gain for the 8-hour treatment tended to be highest at approximately 65 lb, while weight gain for the 4-hour treatment tended to be lowest at approximately 49 lb. There was a 37.2%, 17.6% and 4.4% reduction in total hay dry matter disappearance for the 4, 8 and 12 hour treatments, respectively, compared to the 24 hour treatment. This study would suggest that allowing cows only 4-8 hours/day of

access time to moderate quality, large round bales of hay can reduce total hay needs by 17-37 % (DM basis) without adversely affecting cow performance.

Limit feeding hay. Other Purdue data suggests that limiting daily hay intake can also meet cow requirements if a properly formulated grain-mix is fed. In essence, we are limit feeding a high concentrate ration that would be similar to a feedlot finishing diet. This strategy requires careful management and 30 inches of bunk space per cow to provide all cows equal access to limited amounts of feed. Cows should be separated into at least two feeding groups – a) young, timid, and old cows and b) mature cows. Producer observation of dominance/subordination when cows are fed is important and animals may need to be re-assigned to another feeding group. Similar to starting feedlot cattle, they need to be started slowly on the concentrate mix and the amount delivered per cow increased over time. A good rule of thumb is to feed hay free-choice and start concentrate feeding at 4-lb/cow. Increase the concentrate amount by 1 lb/head on an every other day basis. When cows reach the desired level of concentrate feeding, begin to reduce the amount of hay fed to the designated level. When limit-feeding is started, expect cows to bawl and think they need to be fed more, but hey will adapt to not having a full rumen in several days.

Sample rations for a 1250 lb crossbred cow, 4 months pregnant, gaining .25 lb/d have been formulated and are shown in Tables 2 (dry cow) and 3 (lactating cow). Note that free-choice trace mineralized salt will not meet the mineral or vitamin requirements. Magnesium and Vitamin A are deficient in all of these limit-fed diets and therefore, a mineral containing Vitamin A and higher levels of magnesium is needed. When corn-based byproducts are in the diet, a mineral mix that contains additional calcium (limestone or calcium carbonate) is important to balancing the calcium:phosphorus ratio. In contrast, when corn-based byproducts are not included in the diet, additional phosphorus (such as dicalcium phosphate) is typically needed in the mineral mix.

Table 2. Sample limit-fed, dry cow rations (lb/day, as-fed basis[a]).

Ingredient[b]	**Ration 1**	**Ration 2**	**Ration 3**	**Ration 4**
Grass hay[c]	5	5	5	5
Corn	8.70		4.25	5
Soybean meal, 48%	.90			
Dry corn gluten feed			6	
Soybean hulls		10.75		
Dry distiller's grains				4.60
Limestone			.30	.20
Dicalcium phosphate	.05	.05		
TM salt	.25	.10	.10	.10
Magnesium oxide	.05	.02	.02	.05
Vitamin A	30,000 IU/d	30,000 IU/d	30,000 IU/d	30,000 IU/d

[a] Assumes a 1250 lb non-lactating, crossbred cow, 4 mo. pregnant, gaining .25 lb/d.
[b] Ingredients within ration are listed as lb/d on an as-fed basis.
[c] Assumes moderate quality grass hay.

Table 3. Sample limit fed, lactating cow rations (lb/day, as-fed basis[a]).

Ingredient[b]	Ration 1	Ration 2	Ration 3	Ration 4
Grass hay[c]	7	8	6	7
Corn	14.50	4.25	9.10	9.50
Soybean meal, 48%	2.10	.90		
Dry corn gluten feed			9.10	
Soybean hulls		12		
Dry distiller's grains				7
Limestone	.20		.50	.30
Dicalcium phosphate	.10	.20		
TM salt	.20	.20	.20	.20
Magnesium oxide	.10	.05	.05	.05
Vitamin A	40,000 IU/d	40,000 IU/d	40,000 IU/d	40,000 IU/d

[a] Assumes a 1250 lb lactating, crossbred cow, 4 mo. pregnant, gaining .25 lb/d.
[b] Ingredients within ration are listed as lb/d on an as-fed basis.
[c] Assumes moderate quality grass hay.

Utilize crop residues and stockpiled forages. Wheat straw and corn stover can both be harvested and fed (as discussed earlier) and should be considered, when available, as a way to extend limited forage resources. There is no question, however, that grazing corn stover in the field is more economical than harvesting as large round bales. Begin thinking about how corn stalk grazing might fit into winter feeding strategies. Consider harvesting corn in areas that can be fenced and that have water available. A single "hot" wire can be used as both perimeter and dividing fences if cows have been trained to respect an electric fence. Corn fields should be divided with a "hot" wire and strip grazed to maximize utilization and minimize trampling of shucks and leaves. The nutrient profile of corn plant residues is highest immediately after grain harvest, and they have higher nutrient profiles when grain is harvested earlier, rather than later in the season. During the first 30 days of corn stover grazing, a gestating, spring calving beef cow can probably come close to meeting her nutrient requirements if provided free-choice access to a high quality mineral mix and water. After 30 days, residue quality will decrease and a protein supplement is usually needed. When grazing or feeding low quality forages, make a conscience effort to watch cow body condition. If cows start loosing condition, energy and protein supplementation will be needed.

Grazing or baling of corn residue. The chopper should be disengaged when harvesting grain to allow shucks and cobs to fall directly behind the combine into 2-3 rows. This will help to minimize their deterioration, since shucks and leaves have more nutrient value than the stalks. If corn residues are to be baled, consider baling only those 2-3 rows directly behind the combine where shucks and leaves have been dropped. This will be a higher quality forage resource compared to harvesting all residue material in the field.

Stockpiling forages. Application of 50 lb of nitrogen per acre before late August, if the rains return, can boost fall regrowth of cool-season grasses. In a normal year, this works well for building a stockpiled forage resource that can be used in late fall to extend the grazing season. If urea is the nitrogen fertilizer of choice, apply it when rain is predicted since it volatizes to the atmosphere in hot, dry weather.

Drought stressed corn for grazing, green chop or silage. Drought stressed corn, sudangrass, and sorghum-sudangrass, in addition to certain weeds such as pig weed, lamb's quarters, and Johnson grass can contain high levels of nitrates. The nitrate levels in plants can go up and down rapidly. Nitrate levels tend to accumulate in the lowest part of the stalk, not in the grain or fruit. Cool season grasses such as tall fescue, orchardgrass, and timothy typically do not accumulate nitrate, and legumes are seldom a problem. Green chop made from drought stressed crops such as corn grown on highly fertile soils is the most dangerous. Nitrate accumulation is usually not excessive unless adequate soil moisture is present. Drought stressed crops that receive rain within 5-7 days before harvest can accumulate significant levels of nitrate.

Ensiling typically reduces nitrate levels by 40-60%, and in some cases 80-90%. Toxic gasses such as nitrogen dioxide ($N0_2$) and nitrogen tetroxide (N_20_4) are produced in the ensiling process and may form a brown colored gas on top of the silo. Livestock and people have been killed when this gas, which is heavier than air, floats down a silo chute and into a barn or confined area. Crops that are put in a silo in an extremely dry condition may lose only 20% of the nitrate.

Symptoms of acute nitrate poisoning in animals are related to the lack of oxygen in the tissues. These include muscular weakness, incoordination, accelerated heart rate, difficult or rapid breathing, cyanosis, coma, and death. Less severely affected animals may be listless and only show rapid respiration when exercised. A drop in milk production, abortion due to lack of oxygen getting to the fetus, poor performance and feed conversion can be observed in chronic cases. Of the crop plants, drought stressed green chop corn is the most likely to cause nitrate toxicity. Sorghum/Sudan harvested or grazed under the same conditions may also cause problems. Oat hay harvested from land that has had heavy applications of nitrate fertilizer and a rapid regrowth from rain just prior to harvest has caused a few cases of nitrate poisoning.

If there is concern about nitrate levels in feeds, consider the following:

1. Those who intend to feed drought stressed green-chopped corn from high fertility soils should consider testing for nitrates, especially if a short period of rapid growth has occurred just prior to harvest.
2. Thin cattle in poor health, or those suffering from respiratory disease are more susceptible to nitrate poisoning.
3. Do not allow hungry cattle access to suspect feeds. Take time (1 to 3 days) to make sure cattle are full and consuming a significant quantity of a bulky forage such as good quality grass hay and then introduce suspect feed slowly into the diet.
4. Gradually introduce cattle to suspect forages over a period of several days. The objective is to give the ruminal microorganisms the opportunity to adapt to high nitrate intake.
5. Dilute high nitrate suspect feeds with low nitrate feeds. Dilution is one method that can be used to help ruminal microorganisms adapt to high nitrate feeds. This can be accomplished by blending suspect feeds with low nitrate feeds such as grass hay or concentrates. Grain feeding has the additional benefit of providing ruminal energy to stimulate the conversion of nitrate to nontoxic nitrogen compounds in the rumen.
6. Green chopped suspect forages should be harvested daily in the amount to be fed that day. Storing green chopped forages on wagons for later use can result in feeds that are more dangerous.
7. When grazing high nitrate forages, provide a palatable, low nitrate hay or concentrates to dilute the nitrate. In addition, consider limiting the time allowed for

grazing suspect forages for the first 6 to 8 days by increasing the grazing time each day. For example, cattle that have their rumens full of hay might be allowed to graze high nitrate forage for 2 hours on the first day and increase by 2 hours each day over the next 6 days. Remember, nitrate levels are highest shortly after a drought-ending rain.

8. When grazing suspect forages, stock lightly so animals can choose lower nitrate leaves over higher nitrate stems.
9. Provide large quantities of fresh drinking water. Water dilutes nitrate concentrations in the rumen and reduces the potential of toxicity.

Creep feeding. Providing the nursing calf with supplemental feed takes some pressure off of the cow and can boost calf weaning weights. Purdue data suggests that creep feeding calves can increase calf weights by 30-50 lb (range 0-125 lb) and cow weights by 30-50 lb (range 0-200 lb) at the time of normal weaning. The response to creep feeding is dependent on forage quality, forage availability, and location of the creep feeder. In years where forage quality and/or quantity are limited, the response to creep feeding is higher than when forage quality and quantity are high. Location of the creep feeder can impact calf use and feed intake. Creep feeders should be located where cows congregate such as near water, mineral feeder, and shade. Sample creep rations (Table 4; 15% CP on a dry matter basis) have been created that should support gains of at least 2 lb/d. Rumensin should be added to these creep rations to stabilize intake, minimize coccidiosis, and improve feed efficiency. Tylan should also be added to minimize the potential for liver abscesses. Calves should be vaccinated for over-eating disease (clostridia type C&D toxoid). Once creep feeding is started, make sure creep feeders do not run empty. This can cause over eating, digestive upsets, acidosis, and founder when feed is reintroduced.

Table 4. Sample creep rations (%, as-fed basis)

Ingredient[a]	**Ration 1**	**Ration 2**	**Ration 3**	**Ration 4**
Corn	40			28
Oats	40			
Soybean meal, 48%	16			
Dry corn gluten feed		30		40
Soybean hulls		66	70	28
Dry distiller's grains			25	
Limestone	2	2	2	2
TM salt	2	2	2	2

[a] Ingredients are listed as a percent (%) on an as-fed basis.
Add 0.5 lb of Rumensin 80/ton to = 20 mg of Rumensin per lb of ration.
Add 1.5 lb of Tylan 10/ton to = 7.5 mg of Tylan per lb of ration.
To be fed with free choice, high quality cow mineral, fortified with Vitamins A and E.

Early weaning. Early weaning calves is a viable option for conserving short forage supplies. Early weaning not only lowers forage intake of the cow by removing the lactation requirement, but also eliminates the forage intake and trampling losses associated with the calf. Based on Purdue data, early weaned cows will consume 25% less dry matter than cows nursing a calf. When all factors are considered collectively, over a 30% conservation of pasture resources could be expected if calves are early weaned.

When forage resources are limiting, non-lactating cows in late first trimester/early second trimester of pregnancy can maintain, or gain body weight and condition much more easily

than lactating cows. In a normal year, it is not uncommon for cows with early weaned calves to enter the winter with a .5-1.0 body condition (40-80 lb) advantage over cows that have normal weaned calves. In addition, early weaned calves are much more efficient in converting feed to gain (~4:1) than when the cows are fed to support lactation and gain. Based on Purdue research, the recommendation is that individual calves need to be at least 70 days of age when weaned. Calves weaned at younger ages tend to have stunted growth and look like pot-bellied, orphaned calves. Sample early wean rations (Table 5; 15% CP on a dry matter basis) have been created that should support gains of over 2 lb/d when fed to appetite with free choice hay, minerals and water. Rumensin should be added to the early wean ration to stabilize intake, minimize coccidiosis, and improve feed efficiency. Tylan should also be added to minimize the potential for liver abscesses. If calves were not creep-fed before weaning, begin feeding the grain mix at 0.5% of body weight/day (i.e. 300 lb calf x .005 = 1.5 lb/head daily). Increase grain mix gradually (approximately 1lb/head on an every other day schedule) over the next 7-10 days to equal approximately 1.5% of body weight (i.e. 300 lb calf x .015 = 4.5 lb/head daily). If calves were creep fed prior to weaning, begin feeding grain mix at 1% of body weight.

Table 5. Sample early wean rations (%, as-fed basis[a]).

Ingredient	**Ration 1**	**Ration 2**	**Ration 3**	**Ration 4**
Corn	46	43.5	21	32.75
Oats	35			
Soybean meal, 48%	14.5			
Dry corn gluten feed		52	44	
Soybean hulls			32	32
Dry distiller's grains				33
Limestone	1.50	3	1.5	.75
Dicalcium phosphate	1.50			
TM salt	1.50	1.50	1.5	1.50

[a] Ingredients are listed as a percent (%) on an as-fed basis.
Add 0.5 lb of Rumensin 80/ton to = 20 mg of Rumensin per lb of ration.
Add 1.5 lb of Tylan 10/ton to = 7.5 mg of Tylan per lb of ration.
To be fed with free choice, high quality mineral fortified with Vitamins A and E.
To be fed with free choice, high quality grass or grass-legume hay.

In summary, there are a number of feeding and management strategies that need to be considered both individually and collectively. For example, it may be significantly more economical to early wean calves; sell open, low performing, and unsound cows; and limit feed hay (access time or quantity) to cows. Each operation needs to develop a strategy that makes them most profitable.