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## Managing Forages Under Drought Conditions

David L. Rabas

The primary soil moisture recharge period for Minnesota soils occurs in the late summer and early fall. Frozen soils, runoff and limited spring rains reduce the potential for spring recharge. The rains of late summer and early and plentiful snowfall have relieved the drought conditions that were present in much of northeast Minnesota this past summer. For a large part of the state, however, the rains were too little and the snowfall too late to provide much potential for soil moisture recharge. Unless spring rains are unusually plentiful many farmers in central and north central Minnesota face the prospects of dealing with a second year of drought. Even in northeast Minnesota, spring soil moisture quickly leaves our light textured soils.

There are some forage management decisions that farmers can make to reduce the effects of drought on their forage supply. One or all of the options presented in this article may be needed to survive a drought year.

**Option One — Manage existing forage stands effectively.** Knowing what our existing forage stands are like and managing them to produce maximum quantity and quality is important in any year but can be even more critical in a potential drought year. Evaluating legume survival and stand density early to allow time to plan alternative management strategies is important. If the legumes in a legume/grass stand have suffered severe winter injury or if the legume component of the stand is less than 40%, yield may be maximized by treating the stand as a grass stand and fertilizing with nitrogen.

If summer moisture is likely to be limiting it is important to take maximum advantage of whatever soil moisture and cooler conditions exist in early spring. Maximizing first crop yield will help reduce the effects of poor summer yields. Fertilizing grasses early with higher than usual rates of nitrogen will increase utilization of available spring moisture. Fertilizing grass pastures and harvesting excess forage if available for feedback in summer will help extend forage supplies.

Early soil tests may be needed to carefully evaluate soil nutrient status. Legumes need optimum phosphorus, potassium,

sulfur and boron levels for maximum production. Grasses fertilized with nitrogen will not yield as well if soil phosphorus or potassium levels are low.

Harvesting at a stage of forage maturity which will optimize yield and quality requirements for various types of livestock can improve efficiency of forage utilization. Generally, dairy farmers harvest early to obtain forage quality suitable to maximize use of forage in their ration. Harvesting early often results in regrowth conditions favorable for a second crop. If extreme drought is already present at the time of first harvest, dairy farmers may have to compromise quality for quantity. Beef producers can utilize fully headed grasses and mid to full bloom legumes in most of their livestock rations.

Pasture fertilization is only one method to improve pasture carrying capacity. Pasture rotation will also greatly improve the carrying capacity of most pastures. A small amount of fencing and some additional spring fertilizer can provide pasture for a large part of a dry summer period.

Feeding management can extend forage supplies. Utilizing poorer quality hay for heifers or limiting hay in the ration will reduce dairy forage needs. Beef feeding systems typically waste hay. Limit feeding of high quality forages during warmer

winter weather or feeding to reduce waste can increase forage supply. Storage and management of large round bales to reduce spoilage can also be a source of additional usable forage.

**Option Two — Plant something new.** If your forage stands are poor or if last year's seedings failed, you may need to plant something new for forage in 1989. Serious consideration should be given to the difficulties of establishing new forage seedings under drought conditions before old less productive stands are destroyed. This is especially true if spring plowing is required.

New seedings can be established if spring moisture is sufficient. Seedbeds that were sufficiently prepared in the fall to permit limited and shallow tillage this spring will have the best chance of being successful. Direct seeding with weed control or companion crop seeding with early removal of the companion crop will be more important if limited moisture is available. For some producers late summer seeding (late July or early August for legumes or August or early September for grasses) may be more successful if late summer and early fall moisture returns. Fallow soils with minimum tillage may have better moisture supply. Seeding following

*(continued on next page)*



Oats harvested for emergency forage.

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a grain crop harvested for forage or grain will not be successful until after sufficient late summer rainfall.

Small grain crops such as oats, barley or fall seeded rye can be harvested for forage. In periods of limited moisture it is useful to seed small grains very early — as early as the site can be prepared. Most fertilizer can be applied at a later date. Small grains harvested for forage after heading have limited use in dairy rations. They can however be used for dry cows and heifers and can be good forages for beef cattle. A late oat seeded with an early pea variety can provide higher quality forage especially for protein than small grains alone. Oats and peas and small grains in general are difficult to dry and may be better for silage than for hay. Drying small grains under drought conditions will be less difficult.

Sudangrass or millet can be grown as annual forage crops in most of our area. Millet and sudangrass require nitrogen fertilizer and sufficient heat units to grow well. Millet and sudangrass can be seeded up to mid to late June in north central Minnesota and still produce reasonable yields. Japanese or foxtail millets generally produce higher forage yields than other millet types. Millets and sudangrass grow slowly in early growth stages and weed control may be necessary. Precautions should be taken to avoid nitrate problems in drought stressed annual forages and prussic acid

problems may occur in drought stressed or frost impaired sudangrass especially in regrowth.

Corn is a good alternate forage choice for farmers in areas where corn normally does well. Planting a range of adapted maturities may avoid pollination problems caused by extreme heat and stress at pollination. Early corn hybrids may provide some forage when planted as late as mid June if adequate moisture for germination is available and growing conditions are good. Nitrate problems may occur in drought stressed corn. Chemical weed control should be planned to permit maximum flexibility the following year.

**Option Three — Reduce forage in the ration.** In northern Minnesota dairy rations which maximize use of high quality forages have been more profitable for most dairy producers. Typical high forage dairy rations may contain 60% or more forage. In years when high quality forage is in short supply or when the shortage creates very high forage prices it may be more economical to feed more grain and less forage in the dairy ration. Rations with 40% forage rather than 60% forage require about 20% less forage supply.

Under extreme forage shortages it may be necessary to accept reduced production to avoid the need to reduce herd size. It is not reasonable to expect to avoid health and reproduction problems if high producing dairy cows are required to produce

under limited feed supply.

**Option Four — Buy hay or sell cows.** Many farmers have been forced to reduce herd size due to extreme forage shortages or very high forage prices. In some herds it may be possible to cull carefully and avoid significant production losses. It is important to maintain production levels and health of the highest producing cows. Herd replacement numbers may need to be reduced to provide additional feed for producing cows.

Purchasing high quality hay may be a reasonable practice even in years of high hay prices. High quality hay is not usually priced as high as its true feed value. Buyers should insist on accurate quality hay tests before purchasing hay. Fiber tests for ADF and NDF are extremely important. Intake potential and digestibility are more important forage quality measurements than protein.

With a little luck, warm spring rains will wash away all thoughts of last summers drought. Unfortunately, droughts have a way of returning. The forage management suggestions in this article are generally good ideas for years of good rainfall as well as dry years. We can hope that we will have time to consider them under less urgent conditions than may likely exist in some areas of Minnesota in 1989.

NOTE: Some of the material used in the preparation of this article were adapted from Linn, Martin and Appleman, Livestock Management Information for Drought Conditions. UM Extension Publication, July, 1988.

## China Trip

David K. Wildung

Last fall I had an opportunity to visit northern China and work with fruit researchers at Jilin Agricultural University, Changchun. I was the guest of that Univer-

sity and spent a month teaching their research staff blueberry culture, visiting potential blueberry growing sites and holding discussions with various Universi-

ty and governmental units about blueberry research and management. It was a tremendous experience for me and was exciting to see their interest in blueberries as a new crop for the region. I would like to share a few of my thoughts about their country and their potential for blueberry production.

By our standards Chinese life is very primitive. The average annual farm income in the Changchun area is slightly over \$100 and everything is done by hand. The main systems of transportation are train, bus, bicycle, foot or animal. I traveled by train and car. Soft sleeper train cars were of variable quality but much better than the hard bench seats most Chinese use. Car travel in the country was very slow. One car trip of 180 miles took over 7 hours driving time. The Chinese eat an abundant variety of food and like to entertain guests with banquets. I was able to get by with chopsticks and while not always knowing what I was eating — had more than enough to eat (I was told that according to Chinese custom you insulted the cook if you ate all they served). The population (over 1 bil-



Some of the university professors from Jilin Province and neighboring provinces who attended Dr. Dave Wildung's blueberry lectures in China.

lion), which they are trying to control through family planning, is their biggest liability. The people also are their greatest asset. They go out of their way to be helpful and provide the best possible conditions. They are very loyal. China is making much progress with advances in technology and construction is going on everywhere. They still have a long way to go.

Jilin Province is in northeastern China and borders North Korea. Their climate is very similar to ours — hence the interest in our hardy Minnesota blueberry cultivars. They have many areas in the forested Chanbai Shan Mountain valleys that have acid soils and support their native bog bilberry (*Vaccinium uliginosum*). These areas currently are unmanaged stands of wild plants similar to our wild lowbush blueberry in Minnesota. The bog bilberry is not as productive as our native lowbush. It spreads by rhizomes, and probably would respond to cultural management systems in the same way our native lowbush do but over a much longer cycle of management. Most of their soils while acid enough for

blueberry production are very heavy and often poorly drained. They currently have no commercial blueberry production and are interested in developing blueberry production using either our native lowbush species or our hardy Minnesota cultivars. Utilization of the crop would be primarily as processed products. While I was there I had bilberry juice (tastes similar to cranberry juice), bilberry wine and bilberry candy. The Chinese were also extremely interested in the value of our crop and how we utilize it.

As far as blueberry production potential, the Chinese will have some real problems with their heavy soil types. We talked about soil amendments and since they have a large forest industry sawdust might be utilized as an amendment. They are also looking for lighter acid soil areas for production. Currently they are evaluating cultural management systems for their native bog bilberry. In the future they will be evaluating our native lowbush material (both seedling material and select clones), Minnesota cultivars and hardy highbush

cultivars. They will also have to develop propagation systems as well as marketing systems (sounds like the same situation as with our blueberry industry, doesn't it?). However, they may have solved the hardness concern. They physically bend canes of tender plants (raspberry and currants) down and cover them with soil. It takes over 500 hours per acre to cover a planting but somewhat less to uncover!

I have been asked to assist them in a cooperative blueberry research program for the next few years. Presently I am developing a program that has many parallels to our own here in Minnesota. In our case I think we have made great progress and have a good prospect for the future. In their case they have many more problems to overcome. Perhaps the one most common similarity between them and us is the interest and ingenuity of the people involved. Just as I have seen our Minnesota blueberry program develop I hope to be able to return to China in a few years and see how theirs has developed.

## Are You Ready For The Calving Season

Joe W. Rust

Late winter and spring is a critical time in the feeding and management of the beef cow-calf herd. The need for close monitoring of the herd during calving is well known and usually observed. Other important areas of feeding and management are neglected more often.

The economics of a cow-calf enterprise usually dictate that you feed what is produced on the farm. Sometimes this means that low quality forages are fed during certain times of the year. During the fall and early winter while mature cows are in mid-gestation a full feed of low quality forage may be sufficient; although some supplemental protein may be indicated. During late gestation and especially during lactation a need for additional energy is required. The quality of forages becomes more important at this time. If forages of sufficient quality and quantity are not available, it may be necessary to feed some supplemental grain to insure that the cows are in good condition at calving and to produce milk for the calf after calving. Even more important perhaps, is the need to insure that the cow is not too under-

conditioned at breeding time.

Replacement heifers need some special attention. They should be big enough to reach sexual maturity and be bred at 15 to 16 months of age. Replacement heifers should gain 1.2 to 1.5 pounds per day during the period from weaning to breeding. An abundant supply of excellent quality forage or supplementation with some grain is needed to achieve this gain.

Pregnant yearling heifers need a higher level of nutrition than mature cows. These yearling heifers may be fed separately along with thin mature cows. They should gain about one pound per day during gestation in order to provide for their own growth and the growth of the fetus. A full feed of good quality hay (if available) should provide enough energy and protein. Otherwise consider feeding 1 to 3 pounds of grain per day.

Some planning on how to use the available feed supply is necessary to utilize these feeds efficiently. Remember that while mature dry cows can be fed lesser quality and more limited amounts of forage,

young growing animals and lactating cows need greater energy and protein intake. Again, lactating cows may need small amounts of grain depending on forage quality. With all classes of livestock it is important that they have adequate vitamin A, phosphorus and calcium supplements especially when low quality forages are fed.

When the young calves arrive there is always the concern of calf scours and pneumonia. A clean dry area for calving is the first line of prevention of sickness in calves. Close observation and timely treatment with electrolytes and antibiotics are a help. Especially in large herds, a vaccination program may be in order. It is best to plan ahead for the vaccination program rather than waiting until you get into trouble. It may be too late then. Consider the cost and necessity of individual vaccines and the time required to produce immunity. Since local conditions will vary, it is recommended that you work with the local veterinarian, who is aware of disease occurrence in the area and in your herd, to develop a vaccination program.

# Quarterly Report

Robert F. Nyvall, Superintendent

# Area Days Well Attended

Snow! Snow! Snow! This winter will be remembered as a winter of the big snow. To date, we have had over five feet. Our cross country ski trail is getting a good workout. Most weekends the parking lot is filled with cars.

Our remodeling project is basically completed. We have a pleasant new classroom/meeting room in the basement. Anyone wishing to use this room is welcome to do so; please contact the office to make a reservation. We have also been switching offices around. Jim Anderson, station accountant and Marian Mutchler, senior accounts assistant, have been moved into private offices. Carolyn Frings, executive secretary, has moved into our remodeled main office together with all office equipment. Faye Mostoller, administrative secretary, will move next door into Dave Wildung's office. Dave will move downstairs into Faye's old office. The purpose of these changes was to give our accounting people more privacy and to consolidate our office staff and equipment.

Our library has been split in two; half is the superintendent's office and the other half is a smaller library conference room. Many thanks to Tom Carey for building some beautiful cabinets and to Gordy Bickford and Danny Swenson for doing a lot of moving.

Several pieces of equipment have been repaired in the shop. With the age of much of our equipment, breakdowns are becoming more and more frequent. Our station mechanic Harold Hannay never lacks for things to do. The cost of maintaining such equipment is becoming more and more prohibitive.

Our livestock is overwintering well. To date we have had few problems. Our feed supplies continue to be ample.

The North Central Experiment Station Advisory Committee met in late December. Elise Krueger from Mahtowa has consented to be chairman for the coming year,

succeeding Bart Heitke of Mora. The major topic of discussion was the future of the animal science program at the station, specifically the dairy science program. Other people present were Dr. Dick Goodrich, Head of the Animal Science Department and Dr. Roy Thompson, Assistant Director of the Experiment Station, St. Paul; and Jim Takala, Farm Business Management instructor at the Duluth AV-TI. The conclusion of the meeting was to expand the research herd to a 100-cow herd. It was proposed that a new dairy facility should be built on the new Hauser property. The main thrust of our dairy research will be the utilization of forages as the main source of feed. This type of research will be extremely valuable for dairy producers in northeastern Minnesota and will be beneficial for the entire state. We are in the process of putting together a proposal to be submitted to the Vice President of the Institute of Agriculture, Forestry and Home Economics.

If anyone is aware of the passing away of people who were students of the School of Agriculture or who were affiliated with the School or Experiment Station let us know so we can include this news in the **Quarterly**.

## COMING EVENTS

Annual Minnesota Wild Rice Convention	
Grand Rapids	March 9, 10, 1989
Visitors Day	Thursday, July 20, 1989
Horticulture Night	
	Wednesday, August 30, 1989

Two informational days were held during January. Northeast Minnesota Dairyman's Day was held on January 5 in McGregor and Beef Cow-Calf Day was held on January 25 at the North Central Experiment Station.

Topics of interest to dairy farmers and to organizations providing services to dairy farmers were covered at the dairy day. Dr. Jim Linn discussed management of young stock and dry cows and Dr. Bob Appleman discussed alternatives for stall barns. Dr. Appleman recently returned from a study tour of European dairy operations and presented several innovative ideas to participants of the program. A panel of dairy farmers and service providers shared ideas on profit enhancing strategies that have worked for them.

At the Beef Cow-Calf Day program Dr. Dale Haggard discussed new vaccines and Dr. Jay Meiske discussed new developments in estrus synchronization using MGA and prostaglandin combinations. Dr. Ray Arthaud's topic was "utilizing available feeds for good performance" and Dr. Neal Martin discussed forage testing and "how good or bad are your forages."

Copies of both the 1989 MINNESOTA DAIRY REPORT and the 1989 BEEF COW-CALF REPORT are available by contacting the experiment station. Both of these programs were sponsored by the University of Minnesota Extension Service, the Animal Science Department in St. Paul and the North Central Experiment Station. They were open to the public. If you would like to receive information on future meetings on dairy, beef or horticulture, please contact the experiment station to be placed on the mailing lists.

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