

The Northwest Experiment Station **News**

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STRAW & CHAFF AS ALTERNATIVE LOW QUALITY FORAGES

By George D. Marx, Dairy Scientist

Not all dairy animals need top quality forage all of the time. Non-productive animals, such as dry cows and yearling heifers, can be fed lower quality forages if their rations are properly supplemented. In a year when top quality forages are difficult to make, such as poor haying weather, or when a shortage exists, then one needs to consider alternative forages. Corn silage is probably the most common alternative forage for hay or haylage, but if you don't have the usual forages available, what about straw or chaff for feeding?

Feeding studies were conducted at the Northwest Experiment Station with small grain chaff. This chaff was salvaged with a chaff-saver that was mounted on the rear of the combine. The chaff-saver equipment includes a blower that blows the chaff material into a collecting hopper or chopper box. Chaff was saved from both wheat and oats, and contained small and light kernels along with the loose hulls, small particles of straw and weed seeds. This is a low-cost feed. Collection is inexpensive as the process takes place as the grain is harvested, and no extra trip over the field is required. Attaching the chaff saver on the grain combine is an extra chore, especially the first time, and may not be a viable practice if you custom combine your grain.

The chaff was fed to both dairy beef and yearling Holstein heifers. An analysis of the chaff for nutrients indicated a better feed than expected. The chaff was 89% dry matter

with 11% crude protein, 3.2% fat, 35% fiber, 11.3% ash and 39% readily available starches and sugars.

In one of the more interesting experiments at the Northwest Experiment Station, the chaff was mixed with potato processing wastes and ensiled together using a 50:50 mix by dry matter. The waste potatoes were 22% dry matter, 6.9% crude protein, 8.0% fat, 4.4% fiber, 1.5% ash, 57% starch and 1.3% reducing sugars on a dry matter basis. The wastes consisted of cull potatoes, peelings, off-flavored french fries and potato chips and other residues from the processing of potato flakes and instant potato mixes. The chaff/potato mix was approximately the same value as corn silage in nutrient composition on the dry matter basis and performance was similar and satisfactory for both the replacement heifer's and in the growing ration of dairy males for beef.

When straw is utilized for dairy young stock or dry cows, it is usually mixed with a higher quality forage at a 50:50 basis and then balanced with grain and supplement to meet the needs of the particular class of livestock. Most small grain straw is about 4% crude protein and sometimes will be as low as 3.6% in wheat and rye straw. The acid detergent fiber (ADF) of most small grain straw ranges from 50 to 55% on a dry matter basis and total digestible nutrients (TDN) will normally range from 41 to 47% in most straw analyses samples. One should analyze your own straw samples for a more specific nutrient content.

A good way to increase value of straw or other low quality forages is to ammoniate the forage with anhydrous ammonia. Ammoniation of straw will increase its digestibility about 10% by breaking down the fiber components. The process increases consumption up to 25% and crude protein increases by 3 to 8 percentage units depending on the amount incorporated. An additional advantage when used on higher moisture forages is its ability to preserve the material by killing molds and fungus that cause heating and deterioration of the forage. Fact sheets are available that describe the straw ammoniation process including the procedure, safety precautions, suggestions, cost and other benefits.

Happy 
Holidays
from the
Northwest
Experiment
Station
Staff 

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Smith's Comments



Another crop season is history. While much of the State was experiencing above normal precipitation this past growing season, the immediate area surrounding Crookston was hoping for rain. Jim Cameron, senior research plot technician and "official" weatherman at the Station, reports only 15.87 inches of total precipitation from January 1 through October 31, (Table 1) which puts the Station slightly more than three inches below normal (Table 2). The moisture we did receive this past growing season was evenly dispersed and resulted in excellent yields of some crops. Barley yield of over 100 bu/A and oat yield topping 150 bu/A were the small grain highlights. The University of Minnesota's barley and oat breeders, Drs. Donald Rasmusson and Deon Stuthman have claimed credit for these yields because of the superior varieties they have released. I have assured them, however, that the superior management of the Station's crops by Dale Kopecky and his crew and "Mother Nature" contributed equally. Wheat was a disaster. Ideal weather conditions for scab, a fungal disease, disseminated the crop and yields were off by fifty percent. The Station's sugarbeet and alfalfa crops were above average in yield and quality, with corn yields near normal.

As might be expected from the previous analysis, the wheat plant breeding effort and other wheat research fared poorly in 1993. While these programs had set backs from losing essentially a year's worth of data, my heart goes out to the three graduate

students on Dr. Bob Busch's wheat breeding program who had thesis research at the Station in 1993. As one who lost a year of research data due to disease when a graduate student, I know how they must feel.

The Station lost two valued friends this past summer with the deaths of Sam and Norma Bigger. If volunteers were needed for any Station event, the Biggers were always first in line to help. Sam spent many years with the Minnesota Extension Service in Polk, Norman and Kittson

counties and worked part time for the past three years with the Station's development office. A Sam and Norma Bigger Memorial Fund has been established. Anyone interested in contributing can contact Allan Larson or myself.

A large number of winter research and extension seminars are now scheduled (see Calendar of Events). The Station's Beef Cattle Day is scheduled for December 7, and Dairy Day on January 12. We look forward to seeing many of you at these events.

TABLE 1 Monthly precipitation, 1993

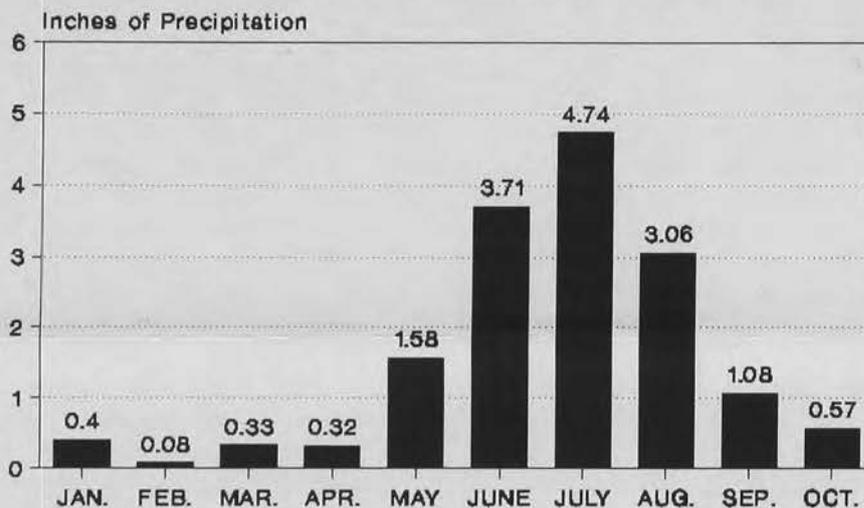
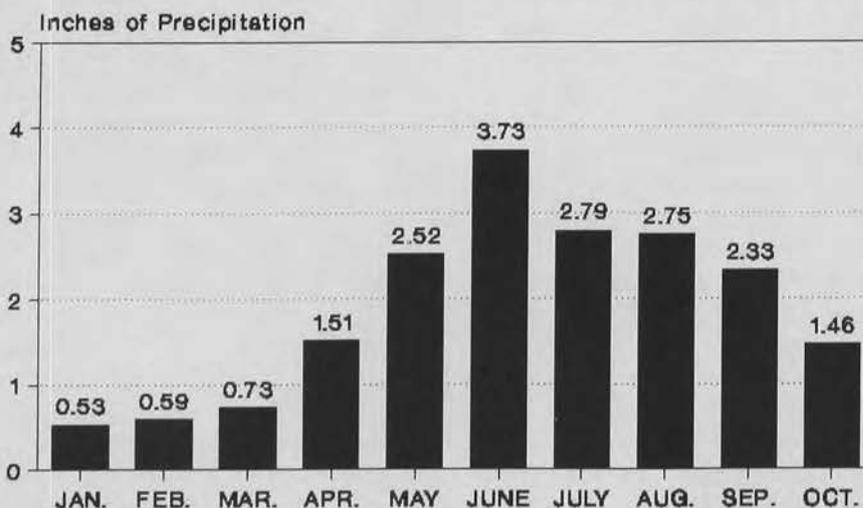


TABLE 2

Average monthly precipitation, 1890-1992



tables compiled by Jim Cameron

26th Annual
BEEF CATTLE DAY

Northwest Experiment Station
University of Minnesota
Crookston, Minnesota



Tuesday, December 7, 1993

Harvey Windels - Animal Scientist, Northwest Experiment Station, Crookston
Hugh Chester-Jones - Animal Scientist, Southern Experiment Station, Waseca
Brent Woodward - Ext. An. Sci., Beef Cattle Production Systems, U of M, St. Paul
Gene H. Rouse - Professor of Animal Science, Iowa State University, Ames, IA
Ron Eustice - Minnesota Beef Council, Minneapolis
Alfredo DiConstanzo - Ext. An. Sci., Beef Cattle Nutrition & Management, U of M, St. Paul
Brian Buhr - Livestock Marketing Specialist, U of M, St. Paul
Jay C. Meiske - Ext. Ani. Sci., Beef Nutrition, U of M, St. Paul

- 9:30 a.m. Registration and Coffee, Ag Research Center Auditorium
- 10:00 **Effect of Trenbolone Acetate (TBA) and Estradiol Implants on Large Framed Crossbred Calves Fed Corn or Barley Diets**
Dr. Harvey Windels
- 10:15 **Feeding and Management of Incoming Calves**
Dr. Hugh Chester-Jones
- 10:45 **NCA Strategic Alliances Project**
Dr. Brent Woodward
- 11:15 **Value-Based Marketing and Instrument Grading**
Dr. Gene H. Rouse
- 12:15 p.m. Lunch - Conference Center - \$ 4.00
- 1:00 **Introduction to Beef Quality Assurance and Injection Issues**
Ron Eustice
- 1:30 **Efficient Use of Alternative Feeds**
Dr. Alfredo DiConstanzo
- 2:00 **Use of Futures in Predicting Beef Prices**
Dr. Brian Buhr
- 2:30 **Breakout Sessions - Choose one session**
a) Informal session on use of futures - Brian Buhr
b) Informal session on use of alternative feeds - Alfredo DiConstanzo
c) Informal session on feedbunk management - Jay C. Meiske
(Informal sessions are scheduled to follow up on talks, thus permitting more in-depth discussion of specific concerns)
- 3:00 **Adjourn** - Coffee and/or view cattle facilities and cattle on trial.

Sponsored by:
Northwest Experiment Station, Animal Science Department, MN Extension Service
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Svedarsky Presents Paper in Costa Rica

Station wildlife biologist, Dan Svedarsky, recently presented a paper entitled, "Gravel Pits as Habitat for Wetland Wildlife in North America and Europe" at the International Wildlife Congress in San Jose, Costa Rica. The paper was co-authored by Chris Tydeman of the World Wildlife Fund in London, England and Richard Crawford from the University of North Dakota, Grand Forks. The paper summarized the extent of gravel mining on the two continents and the opportunities for habitat creation through proper reclamation; especially for wetland wildlife.

The per capita consumption of gravel in developed countries is approximately 8 tons per year with most resources excavated near use areas since haul transportation is the greatest cost determinant. Consequently, a considerable amount of mining sites are close to population centers and if viewed as a "transitional land use" can be progressively reclaimed into new land forms following mining, often with considerable wildlife values. Many mining sites penetrate the water table and present opportunities to create artificial wetlands. By patterning the design of these created wetlands after the most attractive features of natural wetlands and proven management practices, the researchers made the following recommendations for post-mining wetland development:

1. Develop a "complex" of wetland types where possible including a combination of wetland sizes and depths.
2. Provide adequate upland habitat for aquatic species requiring them for nesting or feeding.
3. Consider modifying surface drainage to direct more water into a wetland and/or adding control structures to manage water levels.
4. Design variable shorelines to provide vegetative "fingers" and open water "bays" which add to the total

amount of edge and waterfowl breeding territories.

5. Reduce wave action in larger wetlands by orienting the long axis of wetlands perpendicular to the direction of prevailing winds or otherwise modify by the placement of islands.

6. Construct vegetated nesting islands but separate from the main shoreline by as much water (preferably >50 m) as possible to serve as a predator barrier.

7. Construct gentle shoreline slopes (10:1 to 20:1) to provide adequate littoral zones for feeding, loafing, and nesting.

8. Provide uneven bottom contours to promote an eventual 50:50 distribution of open water and emergent vegetation.

9. Construct water bird nesting or loafing islands by covering low islands with plastic then adding gravel, piling large rocks, or providing floating rafts in deepwater sites.

10. Add topsoil, bottom sediments from pre-existing wetlands, or organic material to bottom of created wetland to stimulate production of aquatic vegetation and invertebrates.

11. Add nesting structures (baskets, rafts, hay bales, culverts, tubs, etc.) to improve nesting success of target species.

Svedarsky has been involved with the wildlife potentials of gravel pits for 20 years when he began wildlife research studies in a 40-acre gravel pit area located at the Red River Valley Natural History Area, a research and education facility of the Northwest Experiment Station. In 1982, the Station sponsored a national symposium which addressed "Wildlife Values of Gravel Pits" and the proceedings continue to be a standard reference on the topic.

Svedarsky served on a task force which examined gravel pit reclamation in Minnesota and contributed to the recently published reclamation manual published by the Minnesota Department of Natural Resources. The week-long wildlife management congress attracted over 700 biologists, researchers, and agency per-

sonnel from all over the world and had as its theme, "Integrating people and wildlife for a sustainable future." Wildlife species are becoming increasingly threatened in many countries due to population and development pressures but a recurring theme of many papers was that effective long-term management programs have to incorporate local people and demonstrate to them that their quality of life and survival is linked to that of their indigenous wildlife. "Eco-tourism", or tourism which focuses on the natural history of a country, is providing an important economic boost to many countries in Central and South America, Africa, and Asia. Many countries continue to struggle with the control of exotic plants and animals which spread and jeopardize the survival of native plants and animals, cause crop damage, and even clog waterways.

Costa Rica was an ideal setting for this first international wildlife congress due to its central location in the Americas, its national conservation priorities, and serving as the location of several international cooperative research projects on rain forest ecology.

CALENDAR OF EVENTS

1993-1994

Beef Cattle Day
December 7

Dairymen's Day
January 12

Red River Valley Winter Shows
February 18 - 22

Small Grains Institute
March 2 - 3

International Sugarbeet Growers
Institute & Machinery Show
March 17 - 18
Fargo Dome

Meet the Staff

During the past 18 years, all of the research scientists have been introduced to our readers. However, the support of the Civil Service and Bargaining Unit employees is very important to the operation of the Station. In this issue we feature the **Sugarbeet Research Crew.**

This department is composed of two full time employees and several summer employees.

Roger Ruthenberg, research plot coordinator, was born and raised in the Nielsville - Climax area. Roger started with the University in April of 1965 in the horticulture department which served both the Northwest School of Agriculture and the Experiment Station.

Roger moved to the agronomy department of the Experiment Station in 1968 and to sugarbeet research in 1978. Roger is responsible for all phases of the sugarbeet project from laying out plots, to hiring summer help, to harvest. Roger and his wife, Darlene, recently sold their home in Nielsville and moved to Maple Lake. They have 2 daughters and 4 granddaughters. Roger's hobbies include woodworking, collecting antique gas engines, and patronizing garage sales and flea markets.

Jeff Nielsen, was hired as a junior scientist on the sugarbeet project in June of 1990. Jeff has an AS degree in seed technology and crop science from UMC and BS degree in agronomic science from the University of Minnesota, St. Paul.

Jeff assists Roger with all phases of the sugarbeet project and does the computer work to get the final results. Jeff and his wife, Shirley, live in Crookston with their three children; Marcia, a student at UMC, Joshua and Brandon. Jeff's hobbies include camping, fishing, walking and biking.

Summer help on the sugarbeet project in 1993 included: **Sara Larson, Kelly Peterson, Suzanne Gulsvig, Kelly Wolfe, Nancy Gulsvig and Jolene Beiswenger.**

Sara Larson is from Euclid. She graduated from Crookston Central, attended Moorhead State University for 2 years and is now a student at UMC where she is majoring in horticulture. Sara previously worked at Pioneer Hybred International, Inc. in Moorhead and Pamida in Crookston.

Kelly Peterson is from Crookston. She graduated from Crookston Central, attended University of Minnesota, Morris and is currently a student at NDSU, Fargo. Kelly worked at Mount St. Benedict Health Care, Crookston Park and Rec. Department and Sigco.

Sue Gulsvig is from Crookston. This is Sue's first year working in the sugarbeet plots. Sue graduated from Crookston Central and is a senior at Moorhead State University where she is majoring in Early Childhood Special Education. Sue has worked

at the Moorhead State PreSchool, Crookston Migrant School Program, Crookston Park and Rec and Villa St. Vincent.

Kelly Wolfe is from Crookston and graduated from Crookston Central. Kelly attends College of St. Benedict in St. Joseph, MN. Kelly has worked for the Station in several areas including Natural History and Horticulture.

Nancy Gulsvig is also from Crookston and this was her first year working in the plots. Nancy graduated from Crookston Central and is a sophomore at Augustana College in Sioux Falls where she is majoring in mass media and government. Nancy worked in the Education Department at Sioux Falls, Villa St. Vincent, and the Grand Forks Herald as a carrier.

Jolene Beiswenger is from Fisher and attends Fisher High School. Jolene has worked for the Station for several years. She teaches ballet for the Nancy Parsley Ballet School in Grand Forks and has also taught her own ballet classes.



Pictured left to right: Roger Ruthenberg, Sara Larson, Kelly Peterson, Sue Gulsvig, Kelly Wolfe, Nancy Gulsvig and Jeff Nielsen. Jolene Beiswenger is not pictured.



New Employees at NWES Station

Julie Beale moved to Crookston in mid June to begin research on a M.S. with Carol Windels. Her thesis topic is on the relationship of *Aphanomyces cochlioides* populations and disease severity on sugar beet in the field. She spent the summer developing an appreciation for beet production and the devastating effects of *Aphanomyces* in a wet season. Julie grew up in North Carolina and received her undergraduate degree from the University of Carolina, Chapel Hill.

Dr. Cheryl Engelkes accepted a Research Associate postdoctoral position on the plant pathology project at the Northwest Experiment Station and moved to Crookston in September. She will be determining the mechanisms of suppression of *Aphanomyces* damping-off of sugarbeet by an oat precrop. *Aphanomyces* damping-off is one of the most destructive diseases of sugarbeet in Minnesota and North Dakota and can result in severe economic losses or in abandonment of fields. Currently, there are no effective cultural practices to control the disease (two tolerant varieties are available, but they are most effective in control of late-season root rot). Thus efforts are underway to explore alternative controls for *Aphanomyces* damping-off, including soil-incorporation of oat as a green manure crop.

Cheryl spent the previous two years at the Biocontrol of Plant Diseases

Laboratory, Beltsville, MD. While at Beltsville, she developed a protocol to electrophoretically analyze microsclerotial proteins of *Verticillium dahliae* after sublethal fumigation with metham sodium (Vapam). The formation and/or destruction of protein bands will be used as a marker to characterize weakening of microscler-

otia and susceptibility of *Verticillium* to attack by biocontrol fungi. Cheryl also investigated the effect of carbon and nitrogen sources on biomass and ascospore production of the biocontrol fungus *Talaromyces flavus*. Cheryl received her PhD from the University of Minnesota in 1991.

EARL CARLSON RETIRES



Earl and Christine Carlson enjoy cake and coffee with Superintendent Larry Smith at Earl's retirement party. Earl retired from his position as Maintenance Supervisor with 29 years of service to the Northwest Experiment Station. Thank you, Earl, and we at the Station wish you and Christine many happy years of retirement.

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Crookston, MN 56716-5001

The Northwest Experiment Station News
Patti Malme, Associate Editor

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