The Northwest Experiment Station News

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Feeding Sunflower Seeds to Dairy Animals

by George Marx

Whole sunflower seeds can be fed to both growing and lactating dairy animals. The seeds are high in energy and protein and can serve as a supplement for these nutrient components in dairy rations. Most of the energy is derived from the high fat content of the seed which averages 40 to 42 percent in oil-type varieties. This fat (oil) has a caloric or energy value of 2.25 times that of carbohydrates such as starch and sugar. Confectionery-type sunflowers are lower in oil content (24 to 26 percent) but average 22 to 24 percent protein whereas oil-type varieties average 18 to 19 percent protein.

There are a number of situations when it might be beneficial to consider feeding sunflower seeds. During times of low market prices they can compete in feed value with other conventional grains. Insect and weather damaged seeds, culls, broken and odd-sized seeds may also be available for feed uses and many times are more economical than conventional grains in terms of both protein and energy value.

Experiments were conducted both at the University of Minnesota, Crookston and North Dakota State University, Fargo on the utilization of sunflower seeds in dairy cattle diets. Very little information on the nutritional value of modern day sunflower varieties exists in the literature.

The primary objective was to determine optimum intake levels of sunflower seed for desirable growth in Holstein heifers and for milk production performance in Holstein cows. Secondly, blood serum, rumen fluid and milk were analyzed for a number of components including total lipids, triglycerides, fatty acids, cholesterol, protein and lipoprotein, urea-nitrogen and glucose on various levels of sunflower seed intake. Heifers were fed total rations containing 0, 10, 20 and 30 percent whole sunflower seeds whereas lactating cows were fed sunflower seeds at 0, 10, 20 and 30 percent of the grain ration. Some small changes were noted in the amounts of various fatty acids in the rumen fluid. Protein in the blood serum decreased slightly with increasing sunflower seed in the diet. Other milk, blood and rumen fluid parameters were mostly unchanged between the various treatments.

Milk production was higher in all groups fed the sunflower seeds as compared to control cows fed no sunflower seeds. The cows consuming the grain with 10 and 20 percent sunflower seed were the most efficient in converting feed to milk. Milk fat percentage was not affected by ration nor were any unusual flavors or odors detected in the milk.

Growing heifers utilized sunflower seeds in their diet very effectively and improved feed efficiency as compared to control animals fed diets without sunflower seeds. However, rate of gain was not different among rations. Total dry matter intake was down slightly by heifers that received the sunflower seeds but total energy intake was similar. The high concentration of fat (energy) in the seeds compensated for the lower dry matter intake which explains the similar caloric intake. The higher fat containing rations did increase most lipid constituents in the blood with a slight lowering of blood glucose.

In summary, sunflower seeds can be fed to dairy cows at levels up to 30 percent of the grain. However, high-producing cows fed high levels of grain should be restricted to 20 percent sunflower seeds in their grain ration or a maximum of six to eight pounds of seeds daily to stay within maximum fat levels of eight to ten percent recommended for dairy cattle diets. Higher levels of fat in the total diet could cause feed refusals and digestive upsets in cows. In these studies, sunflower seeds did not adverse-

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Lactating dairy cows were fed a total mixed ration containing whole sunflower seeds which were fed as a replacement for part of the grain in the diet.

Smith's Comments

Winter has arrived! Having just returned from three days in St. Paul, those of us living in northwest Minnesota can be thankful we do not have the snow and ice conditions that have plagued the central and southern portions of the State so far this season.

The search process to fill the two vacancies that exist on our research staff has begun. The decisions on how to restaff these vacancies have included dialogue and input from our research colleagues in St. Paul, our staff at Crookston, and many producers and commodity organizations. One of the vacancies will be filled with a research scientist that will study the plant disease and insect problems that have increased rapidly over the past few years, and have had substantial impact on the major crops we produce in northwest Minnesota. The impact of plant disease and insects on these commodities has not solely been limited to reductions in yield, but has also increased the cost of production as we have had to rely on increased fungicide and insecticide usage to combat them. The second vacancy will be filled with a soil scientist specializing in soil fertility and management on the soil types and environmental conditions that exist in northwest Minnesota. We hope to have these scientists at the Station by the time spring planting begins.

Recent retirements and retrenchments have resulted in the understaffing of the support personnel on the beef and sheep research projects. Dr. Windels is currently interviewing prospective candidates to fill this needed technical support position. We hope to have this vacancy filled by the time the new year arrives.

Dr. Oliver Strand, extension weed specialist from the U of M St. Paul, died December 1. Ollie, as he was known to those of us in agricultural production, agribusiness, research and extension, spent countless days in northwest Minnesota educating and conducting research for the betterment of agriculture and to help feed a hungry world. His absence will be felt by all.

With the holiday season upon us, the staff of the Northwest Experiment Station wishes you a Merry Christmas and a Happy and Prosperous New Year.

Calendar of Events

Dairy Day
January 10, 1984

Beef Cow-Calf Day
January 26, 1984

Red River Valley Winter Shows
February 17-26, 1984

International Sugarbeet Growers Institute
March 14 & 15, 1984

Crops & Soils Day
July 18, 1984

Warmest Season's Greetings from the Staff at the Northwest Experiment Station

Feeding Sunflower Seeds to Dairy Animals Continued

ly affect ration digestibility nor were any health or feeding problems observed at these levels of intake. Milk composition was not changed substantially with consumption of sunflower seeds. The high fiber content of the whole seed which ranges from 19 to 26 percent may be an advantage in rations consisting of a number of low fiber feeds to help maintain a minimum crude fiber level of 17 percent in the total ration which is required for lactating dairy cows. Young growing heifers also respond well to sunflower seeds in the ration. Sunflower seeds can be used to replace a portion of other feed sources when available economically. These sunflower seeds can be fed either whole, rolled or coarse ground to dairy cattle.

In recent years, a substantial amount of feed-grade sunflower seed has become available for feeding for a number of reasons. Acreage has increased dramatically, some drought situations, delayed planting and early frost, weather, disease and insect damage has resulted in much of the sunflower seed becoming unsuited for the export market and human consumption. This gives livestock producers an opportunity to capitalize on these available feed-grade seeds for animal utilization. Also, in times of low market prices, feeding sunflower seeds may be an alternative marketing outlet for this crop.

Why Not Coconuts?

by John Wiersma

John Wiersma and Mark Hanson, technician, working with new trial data.

Several new trials are established each year within the agronomy department at the Northwest Experiment Station. Among those started during 1983 were: a tillage x disease trial with wheat and barley; a trial involving the application of Cerone to several varieties of wheat and barley; a new alfalfa management trial; a sorghum variety trial, a dicamba (Banvel) residue study; a row spacing trial with soybeans; and a buckwheat date of planting x date of harvest trial. Depending upon your interests and the crops you produce, some of these trials may seem to be of little consequence. Nonetheless, each of these trials is important and each has been designed to answer specific questions. As an example of some of the reasoning that is used to formulate and justify a particular trial, I would like to describe some of the background information and thinking that led to the development of a buckwheat date of planting x date of harvest trial. You may be asking yourself, why buckwheat? Why not coconuts?

Although buckwheat cannot be considered a major crop in either Minnesota or North Dakota, the combined production of these two states accounts for almost all of the buckwheat grown in the U.S. Buckwheat does provide a valuable cropping alternative for producers in northern areas and the development of improved production practices are necessary to establish the potential for expanded acreages and to increase levels of productivity of buckwheat.

Factors responsible for profitable production of buckwheat in northwestern Minnesota have not been investigated extensively and current recommendations for producers are based on research which has been conducted in Canada and in central and southern Minnesota. Additional information pertinent to northwestern Minnesota that would allow growers to make prudent management decisions is desirable.

One of the initial management decisions involved in producing high yields of high quality buckwheat achenes (seed) is timeliness of planting. Optimum dates of planting likely vary enough that recommendations for central and southern Minnesota may not be appropriate for northwestern Minnesota. Similarly, little information is available which can be used to determine optimum times for harvesting a buckwheat crop. Knowledge of the importance of planting and harvesting schedules and their optimum dates would benefit producers and enhance the stability of buckwheat production. O.K., so buckwheat is important to some people in some years, but why are dates of planting and harvesting important?

Buckwheat can be grown under a relatively wide range of environmental conditions, but it is extremely sensitive to late-spring and early-fall frosts. The reproductive development of the buckwheat plant is also very sensitive to temperature and moisture supply. Hot, dry conditions during flowering can cause blasting of flowers and, consequently, reduced seed set and yield. Recommendations concerning dates of planting often reflect these considerations and the optimum time of planting for maximum achene production is usually designated as three months prior to the first killing frost in the fall. Planting at this time should increase the likelihood that: (1) the crop will escape late-spring and early-fall frosts; (2) that periods of highest temperature will coincide with maximum vegetative development and not with maximum reproductive development; and (3) that average dates of frosts in the fall will terminate growth and establish dates of harvest.

Planting earlier than this general recommendation has not resulted in increased yields, unless the superior yields have been associated with escape from early-fall frosts or from hot, dry weather during reproductive development. Cooler soil and air temperatures which accompany earlier dates of planting may slow development of the crop, allowing weeds to compete excessively and, thereby, decreasing yields. An early date of planting also increases the probability of exposing the crop to late-spring frosts. Later dates of planting often result in sharp decreases in yield primarily because of fall frosts. Yields, in general, have also been reported to decline after the recommended planting date even with a killing frost. In southern Manitoba, yields of buckwheat from early June plantings were twice those from late June plantings.

Because of the large range of environmental conditions which occur from year to year and from location to location, optimum dates of planting may vary substantially, especially from location to location. Optimum dates of planting for relatively small geographical areas (e.g. the northern, central and southern thirds of Minnesota) need to be identified to enhance maximum production in each area. For example, production in northern areas of Minnesota, vis-a-vis southern

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areas, may be restricted more by frosts than by high temperatures during flowering.

Buckwheat is a short season crop and in most areas of production the growing season is longer than the 10-12 weeks required to produce yields of 1000 lb/acre or more. Occasionally, only eight to ten weeks are necessary to produce acceptable yields. Since buckwheat normally flowers within six weeks after planting, its life cycle can be divided roughly into six weeks of vegetative development and six weeks or more of reproductive development. Date of planting is a management decision which attempts to align different phases of plant development with expected environmental conditions. This decision should be based on research which has been conducted within the area where production is anticipated.

Date of harvest is also crucial to the production of high yields of high-quality buckwheat achenes, but little information is available which can be used to recommend an optimum time for harvesting. Because of its late seeding date, buckwheat is often harvested after a killing frost and because of its indeterminate flowering habit, buckwheat usually has an assortment of green leaves, flowers, and immature and mature achenes at that time.

An earlier date of planting or a delay in the occurrence of the first killing frost in the fall can extend the period of achene production, but concurrent shattering of mature achenes may exceed additional achene production and, hence, decrease yields. Harvesting the crop too early, before maximum achene production is complete, can also decrease yield. Thus, the decision of when to harvest the crop is equivocal and has led to the general recommendation to harvest the crop when about 75 percent of the achenes are mature or when the plant has a large number of developed achenes and 75 percent of them are mature. Without a killing frost, the decision of when to harvest is difficult. Additional information is needed.

At this time, you may or may not be convinced of the importance of buckwheat as an alternative crop, or of the importance of planting and harvesting dates in buckwheat production. And you may not be particularly impressed with my line of reasoning, but if you've read this far, I'll bet you can't wait until next time to hear about our coconut variety trial!

Barb Klixbull, District Extension Director, Cites Extension - Experiment Station Ties

"The Northwest District Office for the Agricultural Extension Service located at the Agricultural Research Center is my home base," says Barb Klixbull, District Extension Director for the 17 county offices that span the Red River Valley from Hallock to Wheaton. It's more than just an office however, since the choice of location is intended to strengthen the ties between Extension and the Experiment Station.

That decision was part of the reorganization that Extension Director Norm Brown put into operation in July of 1981. Each of the five extension districts in the state have program leaders working with County Extension Agents in Agriculture, Home Economics and 4-H. Assuming this responsibility in the Northwest District are Harry Burcalow-Agriculture, Dick Byrne-4-H, and Barb-Home Economics with Harry and Dick officing in St. Paul. Barb also assumes overall administrative responsibility as District Director.

So what exactly does she do? Asked that question, Barb responds, "It's a multiple set of tasks. Right now, we're finishing up with budget meetings with our partners in counties, the County Extension Committees." Counties support Extension by providing office space, operating expense support for typewriters and telephones and secretaries with salaries for agents paid by a joint agreement with the University. "While it's a complicated process, the partnership arrangement has been a tradition in Minnesota and a good one," according to Barb.

We've also just completed a round of performance development and review conferences with each county staff in the district to review plans of work and discuss with agents how they can best provide educational programs that meet needs of farmers and families," Barb continues. That means a lot of time on the road for the District Program Leader team but time that is well spent in terms of providing reinforcement to staff.

District Conferences are held twice a year with the most recent meeting held November 30-December 1 in Roseau. Barb says, "these conferences are intended to build on the positive and provide training in areas of need. Agents are active participants and are encouraged to share ideas across county lines," Barb explains. "We've had particularly good results from some time we've devoted to public relations training at the last couple of conferences. There are so many excellent quality Extension programs going on in the district and we want people to know about them."

Frequent trips to St. Paul to share concerns of the district are also part of Barb's schedule. While distance increases the hours required, it's important that Northwest District be represented as policy decisions are made that affect the whole State.

Barb sums up by saying, "the job always fills up the calendar, but I'm such a believer in the Agricultural Extension Service and the good that it does extending the resources of the University of Minnesota to every county, that the efforts are well worth it." She adds, "I'm always enthusiastic about talking to people about Extension in their county and seek their suggestions, so I invite comments any time."

NW Station Dairy Herd Wins Award

The annual meeting of the Land 'O Lakes Inc. milk producers unit was held September 19, 1983 in Thief River Falls. A report on the current dairy situation was given along with a slide presentation "Farm to Food".

Quality milk production awards were presented and the Northwest Experiment Station was awarded the highest award for quality milk. This award is based on both low bacteria count and low somatic cell count in the milk. A certificate and engraved plaque were presented to the Experiment Station, Crookston. Alexander Johnson, Senior Farm Animal Technician, accepted the award on behalf of the dairy department.

This is a tribute to the excellent and conscientious dairy crew at Crookston and an indication of their constant attention to proper sanitation necessary to produce a quality product.

Alex Johnson with the plaque received from Land 'O Lakes.

Conservation Day Classes Utilize Station Natural History Area

Carlyle Holen, talks to 6th grade students on Conservation Day.

Carlyle Holen, area extension agent-crop pest management, is pictured with one of the many sections of sixth grade students that attended special classes in the Natural History Area during September. Approximately 135 students were divided into sections with special instructors. The group under Holen used nets to collect insects in several areas and were assisted with identification and note-taking.

The students learned that the greatest majority of insects are beneficial to people and the environment in the roles they play as pollinators, decomposers, predators, parasites and as a part of the food chain. The pollination services of insects alone are probably worth at least six billion dollars annually in this country.

The Natural History Area is a tract of approximately 85 acres set aside by the Northwest Experiment Station in 1971. Its interesting assortment of habitats which include prairie, aspen forest, cottonwood forest, a willow swamp, and a cattail marsh support many types of plant and animal species. Nature trails wind throughout the different habitats allowing educational groups to experience the diverse plant and animal life present and to view ecological research demonstrations. The area has become very attractive to deer which inhabit the area for most of the year.

The area is not a picnic area, but is open to limited educational groups and individuals having serious natural history interest. The area is used as a field laboratory for natural resource students at UMC but it is also available for elementary and high school science classes, environmental education workshops, bird clubs, garden clubs and other citizen groups. A one-room interpretive building (also pictured above) is located on the eastern side of the area and serves as a meeting place and field classroom.

Word Processing - A Reality at the Station

Julie Hamre is pictured with the new word processing equipment which has been in operation since July 1983. Julie types all the research reports, records, letters and memorandums for five official scientists and for several assistant scientists at the Station. Julie drives 25 miles from Fertile each morning to work and is receptionist for the Station along with all of her other duties. She has been employed at the Station for five years.

The new word processing machine, a CPT unit, enhances the skills which Julie has in this position. The unit has a spelling correction capacity of 10,000 words which it checks automatically. It is possible for Julie to add other words to this memory which might be difficult or specifically related to research terminology used at the Station. Julie attended the special two-day seminar put on by the CPT Company in Fargo, ND, to help her learn to use this equipment. Many instruction books accompany the unit and the secretarial staff continues to learn more about the machine in this manner.

The operator types on a standard keyboard and the characters appear on the screen in whatever spacing has been set. Margins can be set and if they need to be reset, the machine adjusts the length of lines to fit in the new margins. It automatically hypenates words which must be separated due to line length. It is usually gramatically correct in this function.

The word processor can store many letters and publications page by page in memory disk form and these are labeled and can be retrieved over a long period of time. Publications, charts and reports can be saved in this manner and changed from year to year, thus saving a lot of retyping since the printer prints out the final corrected page. The printer has two type-size selections at the present time, but more styles are available. The printer prints the letter or material off the disk at up to 45 characters per second.

Lists of names and addresses can be typed in one file and a form letter, in another file. The machine then merges the addresses and letter so each letter is personalized. Names and addresses can be alphabetized or sorted in zip code order. The machine has some mathematical calculation ability. Columns of figures appearing in scientific journals can be added, subtracted, multiplied, or divided. Certain accounting procedures can actually be carried out.

Word processing is becoming a familiar term in the office world and it is likely to be a term which will become more familiar in the technology of research and reporting. Our word processor may someday be connected directly to lines which transmit information to large computer banks around the world.

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