

Miss. (3)



MAY 1962

(4)

Top Agricultural Stories - 1961

- Research
- Recommended Farm Practices
- Farmer Experiences

This archival publication may not reflect current scientific knowledge or recommendations. Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>

COMPILED FROM NEWS RELEASES ISSUED BY THE INFORMATION SERVICE

UNIVERSITY OF MINNESOTA (1)
Agricultural Extension Service (2)
 U. S. DEPARTMENT OF AGRICULTURE

The Institute of Agriculture issues many printed reports and bulletins reporting the results of its research and providing information on new farming and homemaking developments. These appear as Extension Service bulletins, folders, or fact sheets; as Experiment Station bulletins; as articles in Minnesota Farm and Home Science, Minnesota Feed Service, and Farm Business Notes; and in several other forms.

In addition, the Institute also sends news releases to newspapers, radio stations, trade and farm papers, and other outlets. These releases contain valuable information, often not published in any other form, that could be used in the educational programs carried on by county extension agents, high school teachers, and others.

This publication has brought together some of the more important of these releases. Through this publication the Institute hopes to improve its informational service and to extend the reporting of the results of its research.

Agricultural Economics ...

AGRICULTURE RETAINS STATUS AS TOP-RANKING INDUSTRY

Do You Know:

. . . that agribusiness--agriculture and related business--remains Minnesota's biggest industry, in spite of the decline in farm population and farm income?

. . . that agribusiness is Minnesota's biggest source of employment?

. . . that agribusiness is the best customer of nonagricultural business?

. . . that agriculture is the most efficient of all businesses?

. . . and that consumers are reaping big returns from farmers' productivity?

To support these statements, here are some facts and figures cited by Dale Dahl and S. A. Engene, University of Minnesota agricultural economists:

In 1958, 27 percent of the personal income derived from industrial sources in Minnesota came from agribusiness, while manufacturing and trade, the next highest, each accounted for 14 percent.

Agribusiness employed 448,000 in 1958, compared with 140,000 for nonagribusiness manufacturing and 135,000 for nonagribusiness trade.

Expenditures by agriculture account for a lion's share of the gross income of other businesses and of taxes paid in the state each year.

Production expenses of Minnesota farm operators topped a billion dollars in both 1959 and 1958. Major items of production expense in 1959 included the purchase of \$170 million worth of feed and \$147 million worth of livestock. In the same year, Minnesota farmers paid a total of \$171 million in farm property, real estate, and personal property taxes.

Thanks to the new heights of efficiency reached by agriculture, the U. S. consumers' food supply is the biggest, most varied and lowest priced in the world.

In keeping with the national trend, Minnesota farm labor efficiency has nearly doubled since 1939. Livestock production efficiency increased by 29 percent over the base years 1947-49, while the gain in the U. S., as a whole, has been 22 percent. Crop production efficiency in Minnesota went up by 28 percent during this same period, while the gain for the nation as a whole was 18 percent.

This increase in productivity has meant a smaller rise in food prices than in most other things the consumer buys. As of March 1, 1961, U. S. consumer prices for all nonfood products and services were 30 percent above the 1947-49 base period, while food prices were up only 20 percent.

The number of those employed on farms has been cut almost in half in the past 50 years. During this period, U. S. population as a whole

has almost doubled--leaping from 92.4 to 179.8 million. One farm worker now produces food for himself and 24 others--compared with 7 others in 1910.

Workers released from agriculture have moved to urban centers and are employed in industries devoted to the production and distribution of non-agricultural goods and services, which, along with food, go to make up America's unmatched standard of living.

While farmers have made America the best fed nation in the world, their efforts have been rewarded with an increasingly smaller share of the consumer's food dollar.

For example, while gross farm income in Minnesota increased from \$1,299 million in 1940 to \$1,550 million in 1959, realized net farm income decreased from \$552 to \$423 million.

Here are some of the reasons for this:

If farmers increase the supply by 1 percent, the retail price of foods will drop by much more than that.

As families move into a higher income class--as from \$5,000 to \$6,000--they eat more expensive food but do not markedly increase its quantity. And, they demand a lot of food processing.

A University of Minnesota study shows that consumption of farm food products increases about 2.5 percent with a 10 percent increase in the real income of the average American consumer. But the consumption of services built into or associated with food increases 10 to 13 percent with each 10 percent increase in income.

In addition to this, those who have left the farm are consuming food at points far removed from the place it is grown--most of those migrating from rural to urban areas are moving to the east or west coast. The transportation and storage required before food gets to these consumers adds to the already increased cost of services which consumers demand with their food.

"LARGER-FEWER" FARM TREND POSES QUESTIONS FOR FAMILIES

The trend toward fewer but larger farms poses questions which should be carefully considered by many Minnesota rural families as they look ahead.

According to S. A. Engene, professor of agricultural economics at the University of Minnesota, this trend poses the following questions:

Shall the family leave the farm? Must the children look to non-farm opportunities for employment? If so, what? If they stay, what changes in operation will be needed?

Engene says that families with children find that the movement away from the farm raises two types of problems:

1. The number of farms available will be small. It's possible that only one-tenth of the farm boys who reach working age in the next decade will find farms.

2. The capital needed to obtain and equip the farms will be large. Financial backing will be needed either from families or from other people who know prospective beginning farmers well enough to be willing to invest in farms and put these young men in charge.

Engene continues:

Part of the year's activities for many families with older children should be used for discussions of future plans for the children.

Are they interested in farming? Do they have the ability? Will there be a place for them on the home farm or on other farms? If not, where will they find the best opportunity?

If the son is ready to start farming now and the farm is not large enough for two families, should the son find work somewhere else for a few years? Would it be wiser, as many families have done, for the father to find other employment while the son takes over the farm?

Families with younger children should probably spend time in planning for education. Farms of the future will be larger and will demand high managerial and technical skills. How can these best be developed?

Non-farm employment in the future will also demand higher skills. A larger proportion of the young people will want to plan for a college education.

RECOGNIZE FARM SURPLUS AS CHRONIC SITUATION

Recognition of the fact that farm product surpluses are a chronic situation in the United States was suggested by a University of Minnesota agricultural economist as a starting point in any attempts to solve the nation's agricultural adjustment problem.

The suggestion came from Elmer W. Learn.

"In the 1920's," said Learn, "we thought of our agricultural adjustment problem as stemming from the temporary expansion in production occasioned by World War I and the decline of export markets following the war.

"In the 1930's the cause lay in the temporarily depressed incomes of the non-farm sector. We believed the problem was temporary and would be solved by the return of the non-farm sector to prosperous levels of income and employment. Our policy approaches developed at that time reflected this thinking."

Learn pointed out that "the same general solution prevailed in the thinking that characterized the period following World War II. The hope for agriculture again was coupled with prosperity in the rest of society.

"Today, 15 years after the end of World War II, we realize that a prosperous non-farm sector is not enough to guarantee prosperity to

agriculture. We recognize that the tendency of agriculture to produce more than markets are willing to take at prices believed to be fair is a chronic situation."

Learn also discussed various potential solutions to the agricultural adjustment problem, including programs of demand expansion, both domestic and foreign, and alternative programs of production adjustment.

He concluded that demand expansion, both at home and abroad, would not be sufficient fully to alleviate the current surplus situation. Thus, he said, continued attention will have to be given to adjusting production.

"No single program will bring about agricultural adjustment," said Learn. "Furthermore, conditions are constantly changing. A satisfactory program for 1961 may be wholly unsatisfactory in 1965."

In answer to the question of what can be done about agriculture's adjustment problem, Learn said:

"We can continue to make adjustments on individual farms. We can attempt to make all the people better informed about farm problems. And through the democratic processes we can use government where necessary to alleviate hardships.

"In this way we can continue to have an agriculture that is the envy of all the world and one where agricultural producers share in the economic growth that their productivity helps to make possible."

HOW TO PROFITABLY ORGANIZE A CENTRAL MINNESOTA FARM

Two agricultural economists and an electronic computer at the University of Minnesota got together and came up with some specific ideas on how to most profitably handle a central Minnesota farm using recommended production practices.

W. B. Sundquist and L. M. Day, the economists, had interviewed 90 farmers selected at random in an area loosely bounded by Fergus Falls on the northwest, Farmington on the southwest and Carlton on the northeast.

Taking the production resources each farmer had available, Sundquist and Day summarized the figures for each of three "typical farm situations" --the average for several farms--and fed the data into the machine.

They wanted appraisals based on price estimates of \$15.50 per hundredweight for market hogs, \$3.30 per hundred for milk, and \$21.50 for good fat cattle.

The computer returned the following appraisals:

For the small farm--about 39 acres of cropland and 19 acres of open pasture--the most profitable organization is with 12 dairy cows and 66 head of feeder cattle. They'd use up all the available forages and credit and should produce an income net of direct operating expense of \$4,570.

After fixed costs of land, buildings, equipment, etc., are covered, the income from this small farm is excessively low. Also, the supply of labor (one man all year) is not fully employed.

The medium farm--100 acres of cropland and 32 acres open pasture--is most profitably organized with 16 dairy cows, 5 sows farrowed on a 2-litter system, and 138 head of feeder steers. This system is supposed to produce an income net of direct operating expense of \$10,300. However, it takes \$36,310 of credit, mainly to buy steers and corn.

Charges for the use of land, owned capital and depreciation on buildings and machinery need to be paid out of the \$10,300. Also, no charge has been made for operator and family labor.

Most profitable organization for the large farm--196 acres of cropland and 32 acres of open pasture--would include 19 dairy cows, 12 sows farrowed on a 2-litter system, and 154 head of feeder steers.

Income for the large farm net of direct operation expenses is estimated at \$16,370. This operation fully utilizes all available winter labor, as does the most profitable organization of the medium farm.

The large farm is a two-man operation and the medium farm has almost a man-and-a-half of available man labor. Regardless of farm size it's most profitable to fertilize crops at recommended rates and to use minimum tillage--the least possible field work.

In case you'd rather raise hogs than feed cattle, Sundquist and Day say the net income for the small farm would be reduced by only \$330 and by about \$875 for the two larger farms if the cattle-feeding enterprises were reduced to a minimum and hog enterprises expanded to 8 sows on the small farm, 27 on the medium farm and 56 on the large farm.

All hogs would be produced on a 2-litter farrowing and feeding system. The shift from beef feeding to hog production would reduce credit requirements by about 40 percent for the small farm, 38 percent for the medium farm and 25 percent for the large farm.

With market hogs selling for \$17 per hundredweight or more, the economists say the dairy-hog type organization is somewhat more profitable than the dairy-feeder cattle organization.

ECONOMIST REPORTS TRENDS IN FARM ENTERPRISES

As new techniques and new knowledge continue to alter the comparative advantages of different farm enterprises, alert Minnesota farmers find it advantageous to change their crop and livestock projects and the size of their total farm operation.

Truman Nodland, agricultural economist at the University of Minnesota, illustrates this dynamic nature of farming in a recent analysis of Minnesota's SE and SW Farm Management Services records.

Nodland studied records of 105 farmers who belonged to the SE Service from 1950 to 1959, and 48 belonging to the SW Service from 1945 to 1957. While similar in type to all farms in their area these farms are, however, somewhat larger in size and maintain more livestock.

Here are Nodland's findings:

* In order to use large scale machinery and equipment, farmers are increasing the size of their operations and concentrating on fewer kinds of crops.

* New techniques and new methods of production are not always of equal advantage to various farm enterprises. This often makes a shift in enterprises desirable. Major shift in crops has been a change from small grains to inter-tilled crops, mostly corn and soybeans.

* With few exceptions, the number of farmers reporting each class of livestock decreased, indicating a trend toward increased specialization in livestock production on these farms and in southern Minnesota in general.

* The specialization in livestock is accompanied by substantial increases in the size of remaining enterprises on these farms. Net result is an increase in total animal units per farm.

Because of the two trends in livestock, farmers can better justify added investments in labor saving equipment. Moreover, they can concentrate on new techniques and knowledge.

Nodland says each new idea may cause some adjustment in the farm business so the idea may be used most effectively. Already many adjustments have been made in livestock enterprises. This is probably the area where greatest changes will be made in the future.

LAND CONTRACT USE INCREASES IN MINNESOTA

In 1946, only 20 percent of all Minnesota farm real estate transfers were financed by a land contract. By 1960 land contracts were used in financing 55 percent of all farm land transfers.

Why the increase? Philip M. Raup, agricultural economist, says its partly because land contracts offer a way to buy increasingly higher priced land with a minimum down payment, partly because they offer special advantages to the buyer and seller alike.

As far as the buyer is concerned, here are the points in favor of a land contract: First, the down payment is usually lower than is required under a mortgage. With the low down payment a purchaser can establish his position as landowner, and still hold more of his net worth as operating capital, including machinery and livestock, on which returns are usually greater than on capital tied up in land.

Once he's a landowner, a farm operator can avoid some of the uncertainties of renting and can share in any rise in land values.

These are the disadvantages of a land contract to the buyer: Interest payments are usually

heavy because the down payment is low and a large portion of the purchase price is unpaid. Risk of losing the farm under default is somewhat greater than under a conventional mortgage.

If a buyer in Minnesota defaults, the seller must give 30 days notice before he is allowed to forfeit the contract. If strictly interpreted, this gives the buyer only 30 days to raise the money due. If he fails, he risks losing all of his previous investment.

Furthermore, the large unpaid balance combined with heavy payments on principal and interest may make the buyer particularly sensitive to unexpected declines in farm product prices or land values, in the early years of the contract.

As the unpaid balance of a land contract is reduced the buyer may want to refinance with a mortgage to protect his increasing equity. The time when he would normally want to do this may be a bad time in regard to swings in weather, business cycles or interest rates.

Raup says a land contract offers a seller several advantages: Because of the low down payment he can help a relative or favored tenant who doesn't have enough money to buy with a conventional mortgage. Furthermore, if the down payment is less than 30 percent of the purchase price, a land contract permits a seller to spread any capital gain from a farm sale over several years, which often means an overall tax saving.

Another point in the seller's favor is that he can keep his money invested in a business he understands and, if he wishes, use the installment payments he receives as a handy "annuity program" for retirement income. Should the buyer default, it's relatively quicker and cheaper for a seller to settle his claim with a land contract than with a mortgage.

A seller has two main disadvantages with a land contract, according to Raup. First, because the buyer has less money invested the land contract tends to be a higher-risk loan.

Second, a seller may have more difficulty selling his interest in the contract than he would with a mortgage. In most communities, there is no established rediscount market for land contracts involving farm properties. This may become important when sellers are older people who are susceptible to serious illnesses and other emergencies requiring them to convert capital assets into ready cash.

COW NUMBERS DON'T ALWAYS MEAN PROFITS

Two extension economists at the University of Minnesota today offered six words of advice to the farmer who wants to increase his income by enlarging his dairy herd: "Think twice before you do it."

James App and Duane Erickson and extension dairyman Ralph Wayne say it makes more sense to increase production per cow and milk fewer of them.

The economists bolster their argument with these figures: A cow producing 200 pounds of butterfat per year just about covers her expenses and replacement leaving her owner nothing for his labor.

A cow producing 300 pounds of fat per year for a grade A milk market will return her owner about \$100 for a year's labor.

A 400-pound producer will return \$200 for labor, twice as much as her 300-pound herd mate.

App, Erickson and Wayne say that a dairyman needs production records on his herd to provide a sound basis for analyzing his present income situation.

From his records he can decide whether to expand his herd or increase production per cow within his available resources of land, labor, capital, buildings, equipment and feed supplies.

Average production of all Dairy Herd Improvement Association cows in Minnesota during 1960 was 406 pounds, while the average for all cows in the state was 281 pounds of fat.

AGRICULTURE NEARS END OF ERA, EXTENSION WORKERS TOLD

Agriculture has almost reached the end of the era when it can expect reasonable levels of income support and relatively unlimited power to produce, an agricultural economist at the University of Minnesota said today.

Elmer Learn said that for agriculture the real choices of the not-too-distant future are between income support at reasonable levels combined with greater limitations on production--or lower levels of prices and incomes.

"How much lower depends on budget pressure and how far we go toward wiping out existing programs," Learn stated.

The economist said the choice is not going to be made by agriculture alone; all people are directly concerned with farm programs as consumers and citizens and will be heard.

"Educators concerned with agriculture--especially those on the resident and extension staff of a Land Grant College--have a major challenge. The urgency of meeting that challenge cannot be overemphasized.

"We need not and should not speak as proponents for or against agriculture or for or against government programs. But we must speak out to present facts--to strengthen public understanding of the issues and the consequences of alternative decisions," Learn said.

Agricultural Engineering ...

U DRAIN TILE RESEARCH AIDS MINNESOTA FARMERS

Minnesota farmers will save about \$5 million this year on drainage costs because of University of Minnesota research.

This saving comes about because drain tile purchased today have a life expectancy several times that of tile sold some years ago.

Tiling is big business in Minnesota. Farmers in the state spend nearly \$10 million each year to install some 30 million linear feet of drain tile.

To protect that investment, the University's Department of Agricultural Engineering has, since 1919, conducted a strength and absorption research and a testing program to improve the durability of clay and concrete tile.

In the research program, over 100,000 concrete drain tile and cylinders have been made and exposed to laboratory tests and to the bitter sulfate waters of Medicine Lake to measure the sulfate resistance of different types of concrete. Through this research, the sulfate durability of concrete drain tile and irrigation pipe has been increased up to 2,000 percent. The greatest progress has been made in the fields of cement chemistry and proper curing.

Also, some 20,000 concrete drain tile and cylinders have been exposed to acid soils and waters to measure the acid resistance of different types of concrete. Through this research the acid resistance of concrete tile has been increased many times.

While these research were made primarily to improve the durability of farm drain tile, the study has had great impact around the world to better the design of concrete structures that may be exposed to sulfate and acid waters.

P. W. Manson, University agricultural engineer, says quality is now so important a consideration in drain tile selection that no Minnesota farmer is eligible for ACP conservation payments unless he uses drain tile of "standard" or better quality as described in ASTM drain tile specifications C412-60 and C4-60T.

Concrete drain tile are listed in three qualities under ASTM specification C412-60.

Standard quality concrete tile are intended for ordinary land drainage where tile are laid in trenches of moderate depth and width. These tile have an average crushing strength of 800 pounds per linear foot and a 5-hour average absorption of not more than 10 percent. They are not recommended for use when internal diameters exceed 12 inches.

Extra-quality concrete tile are intended for ordinary land drainage when laid in trenches of considerable depth or width, or both. Extra-quality tile through 16 inches in diameter have an average crushing strength of 1,100 pounds per foot of length and an average 5-hour boiling absorption not exceeding 9 percent.

Special-quality concrete tile are intended for use in acid soils or soils high in magnesium

or sodium sulfates, and dirt loads resulting from deep and wide trenches. These tile have an individual minimum crushing strength of 1,100 pounds for tile diameters through 16 inches, an average 5-hour boiling absorption of 8 percent and a maximum individual tile 10-minute soaking absorption of 3 percent.

Concrete tile are not affected by freezing and thawing action.

Before placing tile in trenches wider than 22 inches or deeper than 6 feet, check the tile quality necessary to carry the dirt load with your local drainage engineer.

Clay tile are listed in three classes under ASTM specification C4-60T.

Standard-quality clay tile have an average crushing strength of 800 pounds per foot of length and average absorption not exceeding 13 percent. Sizes of this quality over 15 inches in diameter are not recommended.

Extra-quality clay tile have an average crushing strength of 1,100 pounds and an average absorption rate not to exceed 11 percent for diameters through 14 inches.

Heavy-duty clay tile have strengths ranging from 1,400 pounds for a 6-inch to 1,700 pounds for a 12-inch diameter tile. While there is no acid or sulfate action on clay tile, poor quality clay tile may quickly fail from freezing and thawing action. It is, therefore, poor practice to use low quality clay tile at trench depths under 2 1/2 feet where the ground freezes to a considerable depth.

Manson says drain tile recommendations are written for the consumer's protection and recommends that a customer specify tile quality on his order. High quality tile generally cost no more than poor quality tile.

RED RIVER VALLEY LAND FORMING TRIALS REPORTED

No increase in crop yields but a more uniform soil moisture content and a chance to work the fields earlier in the spring and after heavy rains were among the effects of Red River Valley land forming trials over a three-year period.

Land forming goes beyond the use of field ditches for drainage and a land plane to smooth out headlands, dead furrows and minor natural irregularities. Forming involves reshaping the entire field surface--high spots are cut down and depressions filled in to create a continuous grade to a field or outlet ditch.

Lee. F. Hermsmeier, Agricultural Research Service (ARS) agricultural engineer at Morris, and C. L. Larson, agricultural engineer on the St. Paul Campus of the University of Minnesota, said the Red River Valley area of Minnesota and North Dakota is distinctive because it has definite drainage problems despite a well distributed annual rainfall of only 20 to 24 inches.

Drainage problems come about because of deep clay soils and unusually flat land; slopes of only 2 to 5 feet per mile are common in the area.

Because of the crops grown and the scale of field operations, the parallel ditch system is considered best for Red River Valley land. This system uses widely spaced field ditches running across the slope, row crops planted at right angles to the ditches, and forming used to create a slight continuous grade along the rows.

Since 1957 Hermsmeier and Larson have conducted trials to determine whether land forming in the Red River Valley is a worthwhile practice, and if so, the best possible combination of length and percent of slope, the effect of topsoil removal on crop yields, and whether the use of heavy earth moving equipment causes a soil compaction problem.

They found that soil density is increased by grading and smoothing operations, but that the condition is only temporary.

With normal fertilizer applications, soil cuts more than six inches deep decrease yields to some extent. But heavy fertilizer applications may be used in areas of deep cut to bring the yield up to normal levels.

Different grades and slope lengths used in the experiments had no significant effect on crop yield, soil moisture content or soil temperature. Land forming did not cause moisture shortages at any time during the experiment.

There were no problems in farming across the field ditches, and no water erosion was noted between the rows on any of the plots.

The land forming project, conducted by the ARS regional laboratory at Morris in cooperation with the agricultural engineering and soils departments of the University of Minnesota, will continue with emphasis on yield comparisons between formed and unformed fields.

MOISTURE PROBLEM IN BUILDINGS CAN BE ELIMINATED

Water vapor in the air is a normal condition. But get too much moisture in the air within a building and you're in for trouble.

With too much moisture in a poultry house you wind up with wet litter and dirty eggs. Let moisture build up in a dairy barn--a good-sized Holstein may give off as much as two gallons of water per day in her breath--and you're got a damp, smelly, unsanitary barn, not to mention a lot of building maintenance problems.

Excess moisture in the home causes windows, doors and drawers to swell and stick. In winter high relative humidities cause moisture to condense on windows and form frost or ice. When it melts it stains the window sash and sill, and leads to decay.

But you don't have to put up with all these problems. C. H. Christopherson, agricultural engineer at the University of Minnesota, says if everyone treated posts, sills, lower ends of studs, and lumber in contact or close to soil or masonry with wood preservative and met the requirements for insulation, ventilation and vapor barriers, moisture problems in buildings would disappear.

A good ventilating system brings cool air into a building, which when warmed picks up excess moisture, and exhausts it.

Insulation provides warmer wall and ceiling surfaces so that moisture is less likely to condense in these areas.

Vapor barriers--surface coatings, sheets or membranes--effectively reduce moisture damage when they're installed so as to give a continuous unbroken surface. They belong on the warm side of the insulating material they protect.

RECOMMENDATIONS FOR USE OF BOOM IRRIGATION SPRINKLER

Three recommendations for use of the boom irrigation sprinkler have been made by R. E. Machmeier and E. R. Allred, University of Minnesota agricultural engineers.

* Rotation speed is important, rotate the sprinkler at about one revolution per minute. For more uniform water distribution on windy days, set nozzles along the boom arm at an upward angle of about 20 degrees.

* For greatest power economy, operate the system at a lower pressure. A pressure of 45 pounds per square inch (psi) performed as well as pressures of 55 or 65 psi in tests by Machmeier and Allred. Within this range, and for the nozzles tested, pressure did not have a significant effect on the uniformity of water distribution.

While larger nozzles may require greater pressure to provide adequate stream break-up, it appears that pressures lower than normally considered will distribute water uniformly.

* For most uniform water distribution, use a triangular or staggered sprinkler spacing. Machmeier and Allred tested a 200-foot boom sprinkler discharging 500 gallons per minute. Water was supplied by a deep-well turbine pump driven by a diesel power unit.

TILE FLOW AND POWER USE DATA REPORTED

Practical recommendations for figuring the needed capacity of field tile systems to handle surface drainage are offered by University of Minnesota agricultural engineers.

C. L. Larson and D. M. Manbeck say that a drainage system in southern Minnesota designed to handle three-quarters inch of surface water per day would take care of peak drainage loads six years out of seven.

This is the first report to state how often flooding may be expected with a given drainage system.

Larson and Manbeck base their calculation on continuous measurements of tile flow rates made during the growing season. Records were kept over a five-year period at four locations in southern Minnesota. A pumping plant served as the outlet at each location.

Average rainfall for the five-year period was 28.16 inches, near normal for the area. June was the peak month for rainfall, tile flow and power use.

At two stations where both surface and sub-surface drainage waters are pumped, an average of 5.33 inches of water was pumped during the six-month growing period. The pumps used about 17 kilowatt hours (kwh) per acre of drainage area.

One portion of the study showed power consumption for the 26 tile outlet pumping stations during a seven-year period ending in 1961. Power consumption varied considerably from station to station and from year to year, but averaged less than 20 kwh per acre drained.

AG. ENGINEER GIVES TIPS ON TEMPORARY SILOS

If you're planning on a temporary upright silo, locate it where it's handy for bunk feeding --and if you make it of snow fence or other fencing material, don't build it more than four feet higher than the diameter.

D. W. Bates, extension agricultural engineer, says if you need more silage space it's better to plan for two silos than to go beyond the safe height limit.

Lining a fence silo reduces spoilage by about one-half, keeps silage from falling through the fencing during filling, keeps moisture from escaping, and keeps air from the silage surface.

Bates says you can use any kind of building or roofing paper, with or without fibre reinforcing, as lining. Some papers are treated to resist acid and bacterial action, but black polyethylene and vinyl chloride plastic film wear better and cost about the same.

Be sure to cut the lining long enough to fit against the fence and allow a little for expansion. Otherwise it may ride up or split when the silo is filled. Put up the lining so the edge folds in along the bottom. Snap clothespins are handy for fastening the lining temporarily to the top of the fence.

After you've filled the first section to within about 6 inches of the top, put the second section in place and hold it in position temporarily by tying the fences together with twine about every 1 1/2 feet.

Put up the lining for the second tier so it laps over the inside of the bottom strip; that way the silage settles past the lap without catching.

If you're using snow fence, fill the second section, and so on. If you don't cut the ties, the lining may be damaged or the silo may lean.

AG ENGINEER GIVES TIPS ON SAVING CORN WITH PICKER

The average mechanical corn picker leaves about 10 percent of the crop in the field, according to Arnold K. Solstad of the University of

Minnesota's department of agricultural engineering. At present prices picker losses on a 10-acre field yielding 80 bushels per acre average about \$95.

Here's what Solstad says a picker operator can do to save more corn.

* Pay close attention to the moisture content. Loose ear loss increases as corn dries while shelled corn loss goes down as kernel moisture drops from 30 to 25 percent. Solstad says total field losses are least when the moisture content is between 24 and 30 percent.

* Check the power take-off (PTO) speed carefully. Think twice before you increase the ground speed of the machine. Use a speed counter or tachometer to measure PTO speed and be sure it's as specified by the picker manufacturer. If you don't have an instruction book, figure on a PTO speed of 535 to 550 revolutions per minute.

As far as ground speed is concerned, it doesn't pay to hurry. Speeding up may only increase clogging. And you run a greater risk of accidents.

* Keep an eye on all adjustments. Run the snouts as low as possible in order to get all the stalks. It usually pays to keep the snapping rolls as close together as possible for the crop condition.

Keep roll action aggressive by roughening rolls with some weld metal if they become smooth. If corn is dry, be sure to put set screws in the rolls for better snapping.

* Roll speed may be varied in some pickers. If that's the case with yours, speeding up the rolls may save a lot of clogging. And check your gathering chains to be sure they're in time. Flights in one chain are supposed to run midway between those of the mating chain to provide an even feed rate.

* Adjustments you make at the husking bed will have a lot to do with the amount of shelled corn and trash in your wagon. To decrease shelling, slow down the rolls and increase tension on the roll springs. For less trash, give the feed apron or ear retarder more clearance and be sure the cleaning fan is properly adjusted.

PEELED PAINT? DECAYED WOOD? USE VAPOR BARRIER

A vapor barrier is one thing you don't want to forget when you plan building, remodeling or construction.

Water vapor, always present in animal shelters and homes, tends to travel from the warm side of a building surface to the cold side. It's likely to cool and condense in the wall or ceiling cavity and cause building materials to decay and exterior paint on frame buildings to peel.

A vapor barrier can prevent these problems --if it's made of good materials and installed right.

C. H. Christopherson, agricultural engineer at the University of Minnesota, says a vapor barrier should be installed between insulation and

the warm side of a wall or ceiling. Most insulation batts or blankets have built-in vapor barriers--just be sure to get the barrier side next to the warm wall.

Install vapor barriers without punctures and with lapped joints. Typical barriers are plastic film, asphalt impregnated and coated papers, asphalt laminated papers and metallic foils. Ordinary sheathing felts are not vapor barriers; use them only on the cold side of a wall.

Two coats of high gloss oil or aluminum paint also serve as fairly effective vapor barriers. They can be applied directly to most board type insulation and to walls of plaster, cement-asbestos board, hard-board and similar materials.

The ability of a vapor barrier to resist moisture passage is expressed in perms; the lower the perm rating the better the barrier. Best vapor barriers have a perm rating of 0.5 or lower, according to Christopherson.

See the county agent for more information on insulating modern farm buildings.

LOW PRICED SILO UNLOADER MOTORS MAY BE COSTLY

Competition may be the life of the trade, but competition in the electric motor business may be responsible for the premature death of many a silo unloader motor.

Agricultural engineer A. M. Flikke, explained it this way:

A silo unloader motor has an unusual job. It sometimes has to start an unloader frozen into the silage during sub-zero temperatures. Some days it may operate in temperatures above 100 degrees. The material it handles varies hourly, depending upon the weather. When farmers are in a hurry; they expect an unloader to toss out silage in a hurry--especially during cold weather.

An unloader operates for a comparatively short time, usually less than 30 minutes a day. The short operating period has led to the design of special duty motors with duty cycles of 1 hour or less which are offered in competition with standard motors.

Tests by Junnila and Flikke show a great difference in the types of special duty motors. Some rated for one hour temperature rise were hot in 20 minutes; others met their nameplate rating.

If operated continuously, most specialty motors could carry only 40 to 60 percent of their rated horsepower. This means that a 5 horsepower special duty motor can only deliver about 3 horsepower under continuous operation.

The engineers said a farmer should put as much thought into buying a silo motor as he does in buying any other major piece of equipment on the farm. They pointed out that the amount of copper and the amount and quality of the steel in the motor spells the difference in its performance characteristics.



Agronomy and Plant Genetics . . .

FARMERS MAY SOON CUT HAY BY THE CALENDAR

The day may not be far off when a farmer cuts his hay by the calendar instead of by stage of plant development or height, W. F. Hueg, Jr., extension agronomist, said today.

He said that continuing research studies in Minnesota and other states are building up a strong case in favor of the calendar date idea.

Trouble with going by the height or plant development stage is that cutting is often delayed until the hay or silage has lost much of its feed value and only two cuttings are harvested. Even when it gets rained on, early-cut hay loses less than late cut forage.

In 1960 trials at six widely scattered Minnesota locations, researchers compared two-time cutting which permitted forage plants to approach maturity with three-time cutting on specified dates regardless of plant maturity.

Total forage yield under each of the practices was identical—3.6 tons per acre on a dry matter basis. But a quality comparison showed the value of early cutting by the calendar date method beyond a doubt: The three-time cutting yielded an additional 300 pounds of protein per acre.

With purchased protein costing 10 cents or more per pound, the additional return from early cutting amounted to at least \$30 per acre. Looking at it another way, it's a good reason for hay purchasers to find out when the hay they buy was cut, especially first crop hay, and be willing to pay a slightly higher price per ton for valuable early-cut hay.

FORAGE TESTING BOOSTS FARMERS' PROFITS

How chemical analysis of hay and silage may increase dairymen's profits was explained by William Hueg, extension agronomist at the University of Minnesota.

He reported that a pilot forage testing program was launched in the state during the winter of 1959-60 and was continued by the University of Minnesota Agricultural Extension Service. Forage samples are analyzed at a commercial laboratory in Minneapolis.

The project is under the direction of Hueg and Ralph Wayne, extension dairyman.

Hueg explained that feed costs account for half the cost of producing milk. "We know that forages are the cheapest nutrient source in the ration. They also have the greatest variation in feeding value. Through this pilot program we think we will develop a workable program for all dairymen and livestock feeders who wish to use it," he said.

Hueg reported that after having his forage tested, an Otter Tail County farmer found he had better hay than he thought and the new knowledge enabled him to feed less grain to his cows.

On the basis of forage analysis, a Hennepin County farmer also reduced the amount of grain being fed to his cows and found that no change in milk production resulted.

Forage analysis showed a Dakota County dairyman that he could remove protein supplement from his 20 cows' grain ration, realizing a saving of \$18 a week with no loss in production.

Hueg pointed out that before a testing program for all livestock feeders can be put into effect, more study in forage feeding value and more accurate tests for forage quality determination are needed, as well as correlation of data on actual animal performance and feeding rations based on analysis.

MORE PROTEIN FROM OAT ACRES

One way for a farmer who grows oats to cut down the cost of his protein feeds is to raise an oat-pea mixture, according to a University of Minnesota agronomist.

R. G. Robinson says an oat-pea mixture boosts protein yield per acre and furnishes feed of higher protein content than oats alone.

The total yield per acre depends a lot on where in Minnesota you live. The mixture produced more forage per acre and more feed grain per acre than did oats alone on sandy land in Anoka County and at Duluth, about the same as oats alone at Rosemount, and less than oats alone in southwestern Minnesota. However, at all locations the mixture contained more protein and yielded more protein per acre than oats alone.

The oat plus pea forage averaged 27 percent higher protein content than did oat forage. For feed grain, pea seed averaged almost 100 percent higher in protein than oat grain, and the pea plus oat mixture averaged 52 percent more protein yield per acre than did oats alone.

These additional protein contents and yields may enable some livestock producers to reduce their purchases of commercial protein supplement and still maintain high production.

When it comes to making silage, the oat-pea mixture not only has a higher protein content but may retain more succulence. That means the harvest may be spread over a longer period and the mixture will probably pack better in the silo.

Field observations indicate that new seedlings of alfalfa, red clover, rape or vetch may be established with oat-pea mixtures if moisture is favorable and excessive lodging doesn't occur.

Robinson says one of the main things holding back use of the oat-pea mixture for forage is the high cost of commercial pea seed in the spring. But by harvesting a portion of the forage field for seed production, future seed cost of the mixture can be reduced to that of ordinary farm grown seed.

Pea aphid in southern Minnesota is quite prevalent in alfalfa and canning peas. If it should become generally necessary to spray the mixture for control of pea insects the oat-pea mixture would not be practical.

AMIBEN PROVES EFFECTIVE IN SOYBEAN TRIALS

Amiben, a promising new herbicide, was found to be one of the most effective chemicals for controlling annual weeds in soybeans in trials at the University of Minnesota's Rosemount Agricultural Experiment Station the past three years.

Richard Behrens, associate professor of agronomy, stated that amiben was applied in a band at the time of planting. An application rate of three pounds per acre gave best results.

Behrens also reported:

Atrazine, CDAA and CDAA-T continue to be the most effective compounds for controlling annual weeds in corn. These compounds may all be used in pre-emergence applications. Atrazine may also be used in an early pre-emergence spray. Band applications reduce the cost of this chemical to about one-third of over-all applications.

All of these compounds are cleared for use by the Food and Drug Administration and are available on the market.

SPECIAL SILO NOT NEEDED TO STORE HAYLAGE

Storing haylage in a conventional silo is just like many other propositions--with careful handling, there's no reason it won't succeed.

Haylage means hay crop silage put up with 40 to 60 percent moisture. Normal grass silage is usually ensiled with a moisture content of 65 to 75 percent.

According to William Hueg, extension agronomist at the University of Minnesota, haylage is well worth considering.

For one thing, most cows like it better and eat more of it. That's because with a lower moisture content the type of fermentation is different, resulting in a silage without as strong an odor or taste as normal hay crop silage.

A disadvantage is that haylage harvest requires two operations--you have to cut the crop and let it wilt. Also, successful storage is somewhat more critical because the lower moisture content tends to make the silage fluffy and harder to pack. Your chances for success are good if you closely watch three important factors.

One factor is the crop itself. It must be harvested when the nutritive value is high. Be-

the harvest in the late bud to earliest bloom stage and have it completed by the time the one quarter bloom stage is reached.

Wilt the material to 45-50 percent moisture. Some of the forage will likely be dryer because determining exact moisture content is a problem. You can generally get by with a lower moisture content in material at the bottom of the silo.

A second factor is air exclusion. When air is present, natural sugar in the silage is oxidized to carbon dioxide and water. If air is present, molds usually develop. A short cut and rapid filling are both important, especially when the crop is wilted. Cut the material in one-quarter to three-eighths inch lengths, or as short as the machine can be set.

Keep material in the silo level and as soon as it settles, place high-moisture material--about 70 percent--on top. You'll get away from many of the problems of top spoilage if you cover the silage with a plastic cap.

Final factor is the silo itself. It must be airtight.

If you decide to use the direct-cut method with late bud to early bloom stage forage, plan to add carbohydrate or chemical preservative. A minimum of 200 pounds of ground ear corn or oats per ton of green material will provide the sugars needed for good fermentation.

A chemical preservative, sodium bisulfite, for example, will inhibit bacterial action for the first few days, enabling a better fermentation when conditions are more favorable. It takes about 8 to 10 pounds of chemical preservative per ton of silage.

Hay crop silage helps beat the weather and saves valuable nutrients in early cut forage. Livestock feeders who follow recommended forage harvest procedures report excellent feeding results.

CLIP STUBBLE TO IMPROVE FORAGE STANDS

If you're looking for a quick, simple way to strengthen your new seeding stands in grain stubble, just clip the stubble after grain harvest.

William F. Hueg, extension agronomist at the University of Minnesota, says many forage stands have had a hard time to get established this year. Because of extreme drought in some areas and competition with excessively heavy stands of small grain companion crops in others, forage stands have struggled for moisture, sunlight, and plant nutrients.

Hueg says clipping stubble after harvest will give seedings a boost by eliminating weed competition and will also aid weed control by keeping many weeds from going to seed.

In University of Minnesota trials, more vigorous stands have been produced when stubble was removed. This means better winter survival and expectation of bigger hay yields the following year.

Animal Husbandry . . .

HOG PROFITS MAY INCREASE WITH GROUND EAR CORN RATION

At present day prices, a hog producer may be able to increase his profits by feeding a ground ear corn ration, according to a University of Minnesota livestock researcher.

K. P. Miller, assistant professor at the University's Southern School and Experiment Station, Waseca, said pigs fed ground ear corn will take about 10 days longer to reach market weight than pigs fed ground shelled corn.

But in trials with 16 lots of pigs at Waseca, efficiency of gain (shelled corn equivalent) was slightly improved when ground ear corn was fed. Backfat thickness was reduced about .14 inch and loin eye area increased about 9 percent with ground ear corn rations.

Shelling costs were also eliminated by feeding ground ear corn.

Miller said the trials also indicate that:

* Rations containing 15 percent protein are adequate for 60 to 100 pound growing pigs, while those containing 12 percent protein are ample for finishing pigs weighing 100 pounds or more.

* When meat scraps cost no more than 115 percent of soybean oil meal price per unit of protein, they can satisfactorily replace one-third of the soybean meal in an otherwise typical soybean meal-type supplement. The additional value of calcium and phosphorus in meat and bone scraps is considered when expressing the value of the supplement per unit of protein.

* Pelleting the ration resulted in a 5 percent increase in rate of gain and feed efficiency. But the carcasses of pigs fed the pelleted ration showed some undesirable qualities-- .14 inch more backfat, 1.1 percent lower yield of lean cuts and .17 square inch smaller loin eye.

COBALT "BULLETS" SHOW NO ADVANTAGE

Cobalt "bullets" showed no advantage as a mineral supplement for lambs during field trials conducted in six Minnesota counties during the summer of 1960.

University of Minnesota livestock scientists say the "bullets"--pellets administered with a baling gun which are supposed to furnish a year's supply of cobalt to ruminant animals--appeared to affect favorably rate of gain on some farms, while on other farms rate of gain apparently suffered from the treatment. Average daily gains of all lambs in the trial--both those treated and the untreated controls--were the same 0.24 pounds.

R. E. Jacobs and R. L. Arthaud, extension animal husbandmen; R. M. Jordan, sheep researcher; and H. E. Hanke, staff member at the University's West Central Experiment Station,

Morris, who reported the results, say cobalt is a mineral element necessary to animal nutrition, especially ruminant animals such as sheep and cattle. Feed crops grown on soils low in cobalt have a built-in cobalt deficiency. Symptoms of the deficiency in animals are:

* Depressed appetite, sometimes resulting in starvation in the midst of plenty.

* Lowered hemoglobin content of the blood, producing anemia.

* Lowered production of vitamin B 12--sometimes called the animal protein factor--by rumen microflora. This results in low absorption of the vitamin from the small intestine, a factor which severely lowers productive performance.

The researchers believe most Minnesota soils contain enough cobalt to supply sufficient cobalt in field crops. Also, it appears that sheep or cattle eating either normal amounts of salt fortified by one-half ounce of cobalt sulfate or cobalt chloride per 100 pounds of salt or commercial trace-mineralized salt receive adequate cobalt.

SODIUM BISULFITE STOPS TOXIC SILAGE GAS FORMATION

Laboratory experiments by University of Minnesota animal husbandmen show that treatment of oat, alfalfa and corn silages with sodium bisulfite at the rate of 8 to 10 pounds per ton of silage at the time of silo loading prevents the formation of toxic gases.

This was reported by J. V. Scaletti, assistant professor of animal husbandry.

Death or severe pulmonary or bronchial disorders can result from inhaling gases from freshly filled silos.

While sodium bisulfite prevented the formation of nitric oxide-nitrogen dioxide gas, fermentation of the silage was halted only temporarily. Fermentation increased rapidly after three to five days and exceeded by 10 to 20 percent the fermentation in untreated silage with which it was compared at the end of a 12-day ensiling period.

In the University experiments, treated forage was ensiled in laboratory jar "silos" for 12 days. The researchers checked every 12 hours for the presence of gases. No toxic gases were detected in bisulfite-treated silages during the ensiling period.

HIGH-MOISTURE BARLEY PROVES SUCCESSFUL

High-moisture barley was harvested satisfactorily by direct combine, stored in a gas-tight silo and fed successfully to beef cattle in an experiment at Crookston.

Results of the experiment were reported by E. C. Frederick and Diedrich Reimer at the University of Minnesota's Northwest Experiment Station.

Rolled dry barley and rolled high-moisture barley, each with and without alfalfa hay, were fed to 40 medium grade yearling Hereford steers in lots of 10 each for 170 days. Steers receiving no alfalfa hay were fed one pound per head daily of a special barley supplement consisting of 60 percent dehydrated alfalfa meal, 30 percent dried beet pulp and 10 percent ground limestone.

The steers getting the rolled high-moisture barley plus the special barley supplement were slightly superior in average daily weight gains, feed efficiency and margin per steer over feed costs. The margin for this group was \$35.69 as compared with \$30.90 for those getting rolled dry barley with alfalfa hay; \$27.91 for the steers getting rolled wet barley and alfalfa hay and \$24.48 for the animals fed rolled dry barley with the barley supplement.

Steers fed rolled dry barley plus either alfalfa hay or special barley supplement had the highest marbling scores and USDA carcass grades. No other differences in carcass quality were found in comparing the four lots.

Stilbestrol implants increased daily weight gains an average of 12.3 percent with no significant effect on live market grade.

Rolled high-moisture barley proved to be a highly palatable feed, reported the researchers.

With barley, not corn, the major feed crop in the Red River Valley, the researchers wanted to find out whether this grain could be handled as a high-moisture crop and thereby aid in controlling wild oats, a serious problem in the area.

They found that much of the wild oats was still in the heads when the high-moisture plots were harvested. Approximately twice as much wild oats was found in the high-moisture as compared with the conventional (dry) barley. They also found that wild oats germination was completely eliminated after two months' storage at 30 percent moisture in the gas-tight silo. Ninety percent of the wild oats in the dry barley germinated in a greenhouse test.

A conventional 14-foot self-propelled combine was used in the study. The cutter bar was used for the high-moisture barley, and the dry barley was picked up in the swath. Only slight changes were made in the combine setting for the wet barley.

The wet barley was harvested July 28 and 29 at 16.7-22.3 percent moisture and the dry barley August 1 and 2 at 10.1-13.2 percent moisture. Enough water was added to the "wet" grain to bring the moisture level up to 30 percent in storage.

At approximately 70 degrees outside temperature, the high moisture barley heated within two days after being removed from the silo. But when outside temperatures were below freezing, the wet barley did not heat for several weeks after removal.

The wet barley was most successfully handled and fed when it was removed daily from the silo and rolled into flakes to prevent whole kernels from passing through the cattle.

It was necessary to install a scraper on each roller of a conventional roller mill to prevent the wet grain from building up on the rollers.

CORNFIELD VS. FEED LOT LAMB FATTENING TRIALS REPORTED

You can fatten lambs in the cornfield but it isn't necessarily the most profitable system.

H. E. Hanke and R. M. Jordan, animal husbandmen at the Morris Station and the St. Paul Campus, respectively, reported results of feeding trials with five lots of lambs at the Morris Station. In addition to the cornfield versus feedlot profit problem, Hanke and Jordan sought answers to these questions in their research:

* Should lambs grazing cornfields be fed grain?

* Does pre-harvest cornfield grazing by western lambs during September and October affect the amount of corn drop and yield?

* Is there an advantage in adding hay to the ration?

The researchers turned three lots of lambs into corn plots September 1. They furnished each lot a different supplemental ration.

Lot 1 received a free-choice supplement of 3 parts soybean meal and 1 part salt.

Lot 2 received 9 parts ground corn with 1 part soybean meal mixed 6 parts to 1 part salt.

Lot 3 got the same supplement as Lot 2 plus one-half pound of alfalfa hay per lamb per day.

Feedlot lambs--Lots 4 and 5--received alfalfa hay, shelled corn and soybean meal. All lambs had access to a supplemental mineral mix of 3 parts dicalcium phosphate and 1 part phenothiazine.

At the end of 40 days the cornfield lambs were taken off the plots and weighed. At the same time a mechanical picker harvested the corn, and the researchers measured the number of ears left on the ground, both in the grazed plots and in check plots. Lambs were then returned to the fields and grazed until November 7, when the trial ended.

Here's how Hanke and Jordan summarized the trial results:

. Corn drop in the grazed plots was high-- 11 to 13 bushels per acre compared with a 3.2 bushel drop in the check plots.

. Total gain per lamb for the period was: Lot 1, 20.7 pounds; Lot 2, 22.3 pounds; Lot 3, 17.1 pounds; Lot 4, 33.2 pounds; Lot 5, 32.5 pounds.

. Cost of producing 100 pounds of lamb gain ranged from \$7.49 to \$9.79 for cornfield lambs and \$9.57 for lambs in the drylot. Greater gains on the drylot lambs--although made at somewhat higher cost per pound--resulted in more profit on the average than from lambs pastured in the cornfields.

CAREFUL HANDLING CUTS SHIPPING LOSS

Shipping losses and shrinkage sometimes take a big bite out of market returns from livestock. But careful marketing methods can cut those losses and put money in your pocket.

A. L. Harvey lists these reminders in connection with shipping cattle:

* Continue cattle on the feed they're accustomed to right up until loading time. But it's a good idea to reduce the ration one-third to one-half on the day before the animals leave the farm. That's because an animal usually travels better on a partially empty stomach.

* Allow cattle free access to water--don't take away water and add salt to the ration before shipping to make cattle drink more heavily at market. That procedure fools no one and will probably cost you money. If cattle take on too much feed and water at market the buyer will probably penalize them because he expects a heavy shrink.

* Use a good leading chute--most truckers furnish their own--and back the truck squarely against it so there's no danger of an animal slipping through and bruising or breaking a leg. Inspect truck, chute and runways before you load and remove nails or other projections.

* Move cattle slowly to prevent crowding and possible bruising as cattle move through chutes and gates. Use canvas slappers for driving; electric prods are fine if you use them sparingly. But never use pitchforks or other bruise-making prods.

* Separate bulls from other cattle, and in case of mixed loads, separate sheep, hogs and calves. Use partitions to separate each class of livestock.

* Load carefully. See that cattle fit into the truck snugly and comfortably. Crowding may cause an animal to go down and be badly bruised. On the other hand, if there's too much room, bruising may occur as animals are thrown around.

If the truck isn't fully loaded, put in partitions to keep cattle closer together.

* Put a light layer of sand in the bottom of the truck to prevent slipping and some straw on top of the sand for easier cleaning. Start and stop the truck slowly and avoid sharp turns. Stop frequently to check the cattle and see whether any are down. If an animal does go down, get it back on its feet immediately.

Finally, once you've arrived at market, use as much caution in unloading as you did in loading, so that cattle don't bruise each other or get bruised when they leave the truck.

STEERS-HEIFERS VARY IN LINSEED OIL MEAL UTILIZATION

If a cattle feeder bases his ration on corn silage with a linseed oil meal protein supplement, what's the most profitable amount of oil meal or equivalent amount of protein to feed?

Depends partly on whether he's feeding steers or heifers, say University of Minnesota livestock researchers O. E. Kolari, A. L. Harvey and J. C. Meiske. At least that's the indication they got from feeding trials at the University's Rosemount Agricultural Experiment Station with 64 medium to good yearling steers and an equal number of good heifers.

The most economical gains were made by steers fed 1 1/2 pounds and heifers fed 2 pounds of linseed oil meal per head daily. Feed cost per hundred pounds of gain was \$12 for heifers and \$12.20 for the steers.

Both steers and heifers received corn silage fed to appetite and 8 pounds of combined ear corn and linseed oil meal per head daily during most of the trial. In order to put on more finish, hay was substituted for silage, and the amount of corn was increased during the final days of the experiment.

Feeding 10 grams per head per day of the amino acid lysine has no effect on feedlot performance.



Dairy Husbandry . . .

NITROFURAN CUTS CALF SCOURING

Calves receiving Furaladone in whole milk or milk replacer as a scour control showed greater gains, a more healthful appearance and scoured less than untreated calves in University of Minnesota trials reports A. S. Wood.

In a 35-day trial involving 24 dairy four-day-old calves, those receiving treated whole milk averaged just under a pound of daily gain, while the control calves averaged a little less than three-fourths pound of gain per day.

Furaladone is one of a large group of nitrofurans. It is slightly insoluble in water, is not readily absorbed in the intestinal tract and therefore inhibits the growth of some scour-causing bacteria.

By retarding growth of these intestinal pathogens in young calves, Furaladone could cut calf mortality and get calves off to a faster start, Wood said.

EARLY WEANING OKAY IF CALF CAN HANDLE DRY FEED

You can wean your calves when they're about a month old if they'll eat enough dry feed, according to University of Minnesota dairy researchers.

Dry feed for a month-old calf usually means cereal grains because a young calf can't take in enough roughages. It pays to watch the feeding program carefully; feeding a calf large amounts of grain when he's old enough to handle roughage may cut down his roughage utilization.

Enzymes--substances that speed up the chemical process of absorbing food--are secreted in a calf's stomach and intestine and break down nutrients in milk or milk replacers to products his body can use. These enzymes can't break down cellulose, the common carbohydrate found in plants--that's done in the holding stomach, or rumen.

A young calf can't use forage carbohydrates effectively because his rumen is small and does not then contain the microorganisms necessary for fermentation.

Dairy researcher W. A. Olson recently studied rumen function by surgically inserting a cannula--or window--into the rumen of a 5-day-old Holstein calf. The cannula is easily opened for observation of the rumen interior and insertion or removal of samples into the rumen without hurting the calf.

The researcher tied a small nylon bag on a string, put in a weighted quantity of purified cellulose and lowered the bag through the cannula into the rumen. He removed the bag daily, checked cellulose loss as a measure of digestion, and refilled the bag.

Olson found little cellulose digestion through the 13th day of age. But by the time the calf was 3 weeks old his digestion of cellulose was nearly comparable to that of mature cattle with similar diets.

Cellulose digestion increased as the diet shifted from a grain and hay ration to an all-hay ration. When grain was again offered to the calf the rate of cellulose decomposition decreased.

Cereal grains contain large amounts of starch, a carbohydrate more readily broken down than cellulose. Evidently rumen microorganisms prefer to attack the comparatively easy to digest starch rather than the less available cellulose.

EXTENSION DAIRYMEN GIVE TIPS TO BEAT BREEDING PROBLEMS

If fertility problems in your dairy herd sometimes make you rue the day you saw your first cow, here are some tips from extension dairymen at the University of Minnesota that may help you.

Feed cows and heifers adequately to maintain thrift and vigor.

Check your cows for heat periods twice a day. Record all heats, whether a cow is bred or not, and watch for her heat period again in 17 to 24 days. Keep accurate records on calving dates and all abnormal conditions such as trouble at calving time or cleaning problems.

Wait at least 60 days after calving before you breed a cow back. It takes that long for her reproductive organs to return to normal.

Breed during the later part of the heat period. If you use artificial insemination, work closely with your technician.

Do all you can to control diseases that interfere with normal reproduction. Be sure that all animals coming into herd are free from disease. Vaccinate calves at 4 to 8 months for added protection against brucellosis.

Vibriosis and trichomoniasis can be controlled through artificial breeding, as these diseases are spread largely through natural service to an infected sire.

A leptospirosis vaccine is available that gives protection for about one year.

Call your veterinarian when breeding problems arise. Better yet, arrange for regular pregnancy exams, and you'll have a head start in treating problem fertility cases.

CONDITIONED HAY RATES HIGH IN PALATABILITY

Not only does conditioning hay with crushers or crimpers speed up drying, but conditioned hay rates high in palatability for dairy animals,

University of Minnesota Agricultural Engineering and Dairy Husbandry Department studies show.

Results of the studies are reported by A. C. Linnerud, J. D. Donker, and John Strait and A. M. Flikke.

They found that conditioned hay was usually just as palatable or more palatable than non-conditioned hay when moisture content was similar.

An average of trials during the summers of 1959 and 1960 showed that animals consumed about four percent more conditioned hay than non-conditioned hay.

However, it was discovered that conditioned hay may become more unpalatable than non-conditioned hay after a heavy rain, although the conditioned hay may be ready to bale several hours sooner. Palatability of hay from different conditioning machines was found to be about equal.

In terms of palatability, date of cutting and moisture content of hay at the time of baling were found to be at least as important as whether or not hay was conditioned.

Other facts brought out by the studies:

Conditioning of hay speeds up drying under almost all weather conditions. In good hay making weather, conditioned hay may be put up one day earlier.

Protein analysis is related to consumption of hay within a feeding trial. Calculated total TDN (digestible nutrient) value of hay is related to consumption.

GIVE FRESH COWS FULL FEED, SAYS U DAIRY HEAD

"The old idea that we should get a fresh cow back on full feed gradually over a period of several weeks after she calves has no place in modern dairy herd management," says C. L. Cole.

"We use to feel that a high level of concentrate feeding at calving time would increase the risk of udder swelling, mastitis, milk fever and other problems," Cole said. "Today we know that about the only thing we'll get from heavy grain feeding after calving is more milk."

He recommended that dairymen begin increasing concentrate levels for dry cows as soon as they've been properly dried off. "For top production a cow should be back on full feed by the time she calves."

SUPPLY AND NEEDS OF VITAMIN A FOR DAIRY CATTLE

"Vitamin A, the most important vitamin in livestock feeding, is sometimes deficient in dairy cattle rations. Serious deficiencies are most likely to occur when cattle have been on dry feed for long periods--or between now and the time cattle go on pasture."

If you're wondering about the vitamin A content of your dairy ration, here are some guides from J. D. Donker.

Dairy cattle, like other animals, manufacture vitamin A in their bodies from carotene in the roughage they eat. The amount of carotene they need is measured in milligrams (mg.) and depends on animal's weight. Most authorities agree this amounts to 3 to 9 mg. per 100 pounds of body weight per day for growth and reproduction. A cow doesn't need extra vitamin A for milk production, but the quality of her milk in regard to vitamin A and carotene content is affected by the amount of carotene she eats.

A 1,200 pound cow needs about 100 mg. of carotene per day. That's about what she'd get in 3 pounds of high-quality dehydrated forage, 20 pounds of good color corn silage or about 15 pounds of fairly good quality hay.

Calves under 6 weeks old sometimes don't eat enough field-cured hay to satisfy their carotene requirements. Dehydrated alfalfa pellets usually satisfy their needs.

The carotene content of feedstuffs is hard to predict. Green forages usually contain about 100 to 300 mg. per pound of carotene on a dry weight basis. But the carotene content of feeds continually decreases in storage. Field-cured hay put up without rain may lose 95 percent of its carotene. In rain-damaged hay the carotene loss is nearly complete. Loss in silage is less--about 80 percent, while directly dehydrated material loses only about 75 percent.

As fed, good quality dehydrated alfalfa generally contains about 40 mg. of carotene per pound and good quality corn silage 5 to 6 mg. per pound. A pound of depleted hay usually contains less than 1 mg.

Cattle can store several months' supply of carotene in their bodies, mainly in the liver, and draw on the stores when they don't receive enough carotene in their diet. Only after several months on a poor ration are symptoms of vitamin A deficiency generally noted.

Deficiency symptoms in dairy cattle include calves that are weak at birth, with watery eyes, head colds with nasal discharges, sometimes a cough, and scours and diarrhea. Older animals may show poor appetite with emaciation (gradual wasting of flesh); a rough hair coat; sore feet; dry scaly skin; and finally night blindness and convulsions. Pregnant animals may abort or give birth to blind calves.

Although these symptoms generally indicate vitamin A deficiency they are not exclusive. A ration short on energy-producing material may cause several of the same symptoms.

If a dairy ration is short of carotene the most economical supplemental source is probably dehydrated alfalfa meal or leaf meal which carries a guaranteed analysis. Synthetic vitamin A also gives good results and is fairly inexpensive.

CAN'T JUDGE COW'S PRODUCTION ABILITY BY LOOKS

You can't judge a cow's ability to produce milk and cream by just looking at her--you need production records to eliminate guesswork.

That's what 4,953 dairymen found out when they vied in a contest conducted in 16 counties of the state by the University of Minnesota Agricultural Extension Service.

Of the 4,599 dairymen who attempted to judge cows' production ability from pictures of the animals, only six managed to place the cows correctly. Extension dairymen at the University say that by the laws of chance alone one person in 720 should have placed all the cows correctly.

Most contestants would have been farther ahead to disregard the cow's looks and simply guess at a top and bottom number. Purely by chance one person in six should place the top cow correctly, and one in six should get the bottom cow where she belongs, according to the University dairymen.

But only 503 contestants, about one in 10, placed the top producer in the right place, and only 365, less than one in 12, put the poorest animal where she belonged.

FLAVORED FEEDS SHOW NO ADVANTAGE

Go to a lot of trouble adding special flavors to a calf's grain ration and what happens?

The calf ignores your efforts. At least that's what happened in recent feeding trials at the University of Minnesota's Southern School and Experiment Station, Waseca.

Dairy researchers Kenneth Miller, W. A. Olson and J. B. Williams wondered if a flavored ration would promote greater feed intake and more rapid gains. To find out, they set up a feeding trial with a group of 32 dairy calves. Each calf was weaned early, at 29 days of age, and assigned to one of three groups. Early weaning is important because it puts greater emphasis on the grain portion of a calf's diet.

Group one received a basic concentrate ration of 39 parts ground shelled corn, 29 parts ground oats, 20 parts bran, 10 parts soybean meal, one part trace mineralized salt and one part steamed bone meal. Group two got the basic ration with synthetic sweetening, and group three received the basic grain mix with a synthetic sweet-milk flavored compound.

The calves were kept in individual pens and fed all the concentrates they cared to eat until they were 42 days old. After that they were fed 4 pounds per calf per day. Throughout the trial all calves had free access to water and good quality alfalfa hay.

At the end of 6 months all calves weighed about 350 pounds above their birth weights. Some calves in each group showed slight variations in acceptance of flavored feeds. But as a whole, no group showed a meaningful difference in feed consumed or rate of gain.

DAIRY SCIENTIST STRESSES QUALITY HERD MANAGEMENT

Perhaps the greatest influence on a cow's production is her reaction to her handler and her environment.

J. B. Williams said that to get maximum production from a cow, man must first get her maximum cooperation. "But too often barns are built and dairy layouts completed for the convenience of man and not for the convenience of dairy animals. And too often a cow doesn't get the kind and amount of feed she needs for top production," he said.

Studies in genetics and sire provings are greatly influenced by the feeding and care of a sire's offspring. "Such provings and genetic studies are so confounded by the environment and the caretaker that the true genetic worth of a cow--and consequently her sire--cannot be accurately evaluated at present."

Williams cited four major forces that seriously hamper the well being of cows in most dairy herds: Undersize stalls and stanchions, underfeeding, careless treatment and hurried handling, and ventilation and temperature.

"Many dairymen actually don't see many of the things that go on around their barns or don't feel these things are important." But one thing is certain. When a cow capable of producing 600 pounds of butterfat is handled by a man capable of managing a 300 pound herd, the cow is immediately reduced to the 300 pound production level."

ENE METHOD USED FOR MACHINE CALCULATION

The estimated net energy (ENE) method of estimating the amount of concentrates needed in a dairy ration is more accurate than the commonly used total digestible nutrient (TDN) method, according to a University of Minnesota dairy researcher.

J. D. Donker said that a dairyman whose herd records are machine-calculated through the DHIA-IBM testing program now receives feeding recommendations each month for each cow in his herd, based on the ENE method.

The machine feeding recommendations are based on feeding standards compiled after years of evaluating dairy cow needs in terms of nutrients for normal performance. Feeding standards carefully consider maintenance, growth, reproduction and milk production.

ENE calculations are used because lack of energy is usually the first thing to limit a cow's production.

Most important factors in getting reliable machine recommendations are accurate estimates of the amounts of forages being fed and exact evaluation of forage quality. When the machine has this information together with a cow's production, it computes the amount of concentrate needed to balance her ration.

Trouble is, the machine must rely on information which is based on human judgment and knowledge. If judgment errs or the knowledge is false, the machine recommendations won't be exactly right. And at certain times--as during the flush production period just after calving--a cow may not have the capacity to handle the recommended amount of feed.

The machine recommendations are about the most accurate feeding guide a dairyman has today. But it's still important to watch each cow's appetite and production closely and adjust a cow's ration to her individual needs.

Donker said the machine method of applying feeding standards to the cows and feedstuffs at hand will someday include protein recommendations. But before this development--and to insure highest accuracy in balancing energy needs--there is need for an accurate assessment of the feeding values of the forages a dairyman has on hand.

NEW METHOD MAY IMPROVE DAIRY SIRE SELECTION

All dairy bulls in artificial insemination (AI) service have one thing in common: their influence can mean millions of dollars to dairymen--millions in profits if a sire is outstanding, millions in losses if he is poor.

Here is the way C. L. Wilcox and C. L. Cole, University of Minnesota dairy specialists, explain it:

The service of a dairy sire has gone far beyond the most optimistic estimates of early AI workers. The average number of services per sire in AI service is now about 2,500 per year--30,000 to 40,000 services are not uncommon. Under present conditions a sire may have a lifetime potential as high as 750,000 services.

Obviously, only the best sires should be picked for AI service. But what guarantees that the best ones are selected?

Generally, a sire's transmitting ability is measured by comparing the production of his daughters with the records of their dams. The USDA has done this since 1935, through Dairy Herd Improvement Association (DHIA) records.

Since most AI sires are first used for natural service in private dairy herds, these dam-daughter comparisons are called natural service proofs. Generally, the higher the production of the daughters over the production of their dams, the higher the sire's considered value.

Naturally, persons selecting sires for AI use have turned to the proved sire program as a guide to tested sires. As a results, about 80 percent of all inseminations are with semen from proven sires.

How successful the AI associations have been in sire selection is hard to tell. Production gains have been recorded but it is difficult to tell what portion may be credited to better breeding. Several reliable studies which compare production from AI and private breeding programs have reported little difference between the two.

In a Minnesota study of artificial breeding, daughters of untested sires produced at about the same level as daughters of sires selected on a natural service proof. Furthermore, there appeared to be but slight relation between a sire's natural service proof and the production of his AI daughters.

This doesn't mean that artificial breeding has failed to bring about genetic (inherited) gains in dairy cattle. Through AI there is a wider selection of sires available for natural

service. And some sires in natural service are themselves the result of artificial breeding. But, while it seems clear that some gain has been made through AI, it also seems clear that the full genetic potential of artificial breeding is not being made available to dairymen.

The natural service proof is sound only under the same conditions in which it was made. Feeding and management have a lot to do with a cow's production and both vary from herd to herd. If this effect is underestimated, the sire is credited with a higher breeding value than he actually has. Also, in natural service the sire is usually evaluated on a small number of tested daughters; chance alone could cause these to be better than the average of all his daughters.

One possible way to solve these problems and get a more reliable test of a sire's value is to progeny-test young bulls through a limited number of AI matings and select the best sires for continued service.

The difference between this method and a natural service proof is that a sire's daughters could be tested under a number of different environmental conditions--differences in feed, milking, handling, housing and the like--which are found in a given breeding area. Test sires could then be compared on an equal basis.

But if a progeny test is to be the basis for future sire selection, there are still questions to be answered--for instance, what type of production information will give the most reliable estimate of breeding value? And how many daughters must be tested?

Wilcox and Cole studied production records of nearly 6,400 AI daughters of 98 sires used in Minnesota. Each sire was evaluated by three methods: (1) the average production of his daughters, (2) the difference between daughter and herd average production, and (3) the difference between daughter production and production of cows of the same age in each herd.

The researchers found that if the daughters are distributed in a number of herds throughout the breeding area and if there is no selection of mates, the simple daughter average is an adequate measure of a sire's breeding value. Under those conditions records on 20 to 25 daughters will give a reliable indication of a sire's worth.

EXTRA RATIONS FOR HIGH PRODUCERS ADD DAIRY PROFITS

Probably the greatest mistake in dairy feeding is underfeeding the high producers.

Limiting grain to 10 to 15 pounds per cow per day or using the old thumb rule of a pound of grain for each 3 or 4 pounds of milk means too little energy for high-producing cows; that's evident by the number of thin cows in dairy herds today.

William Mudge, extension dairyman, says that grain feeding to the fresh cow should be increased gradually as long as her production continues to increase. This allows each cow to set her own grain limit, according to her producing ability and her appetite.

Since a pound of milk sells for more than a pound of grain, it's just good business to trade a pound of grain for a pound of milk. The man handling the feed scoop will have to pay close attention to the milk scale and the cow's appetite, but it pays out in higher production and greater net returns.

The grain mixture you feed will depend a lot on the quantity and quality of roughage available on your farm. If you have plenty of early-cut, high quality legume hay, your grain mix may consist entirely of home grown grains. But if hay quality is only about average, cows need a grain mix containing 14 to 16 percent protein--about a pound of protein concentrate to 4 to 6 pounds of grain.

Protein quality, a problem with hogs or poultry, doesn't bother a dairy cow; microorganisms in her rumen convert simple nitrogen compounds into good protein.

That means feed cost is the main consideration in choosing a protein supplement for dairy cattle, so it makes sense to compare prices--divide the cost per 100 pounds of feed by the protein analysis to find price per pound of protein--and buy the cheapest protein source you can get. In Minnesota this is usually soybean oil meal.

If you use urea as a protein source, be sure to mix your feed mechanically--the old scoop shovel method isn't thorough enough. A cow could be poisoned by eating too much urea at once. Urea should be limited to 3 pounds per hundred pounds of grain and should supply no more than one-third of the total protein in a ration.

Research shows no advantage in adding antibiotics to a milk cow's ration. Stilbestrol, widely used to boost gains of beef animals, does not increase milk production.



Dairy Industries . . .

MINNESOTA RESEARCH ADDS TO MILK FLAVOR KNOWLEDGE

A greater understanding of flavor and physical changes in milk and milk products may come about because of research by University of Minnesota dairy scientists.

J. D. Punch, J. D. Olson, Jr. and E. L. Thomas found that psychrophilic bacteria often cause flavor and physical defects in milk at lower populations than is generally recognized.

Psychrophiles grow rapidly at refrigeration temperatures and may cause spoilage of milk, milk products and many other food products. Because they like plenty of oxygen, they grow best and often develop large populations at the surface of milk when it stands undisturbed and frequently cause flavor and physical defects in the surface layer.

When milk is mixed, the bacteria become distributed and the population per unit of mixed milk seems negligible by comparison with surface layer populations.

The Minnesota scientists tested 48 pure culture strains of psychrophiles to find the population levels of each strain required to bring about a detectable flavor or physical change in milk.

They found the numbers varied considerably, and some change at surprisingly low population levels. Also, certain off-flavors of non-bacterial origin such as feed and oxidized flavors often disappeared just prior to the development of off-flavors by the growing bacteria.

MILK MAY HELP PREVENT STRONTIUM 90 ACCUMULATION

There is scientific evidence that a diet including milk is not only safe but also may be a factor in preventing large accumulations of strontium 90 in the human body, says Vernal S. Packard, University of Minnesota extension dairy products specialist.

Packard further states that some who, out of exaggerated fears, exclude milk from their food list, may be doing so at the risk of a nutritionally inadequate diet.

Research indicates that persons in low fallout areas of the world who live on diets low in milk and high in plant foods have nearly the same amount of strontium 90 in their bones as Americans, although fallout over the U. S. has been significantly greater, he said.

Most estimates of experts around the country indicate that only about 3 percent of all radiation exposure of the average adult comes from food sources. The great majority of radiation comes from other external sources.

Radioactive elements which are taken into the body with food may enter when a human eats plant foods--or the plants may be fed to cows and their milk used for human food. But before she makes milk, a cow screens as much as seven-eighths of the strontium from her diet.

If a cow is fed a mineral supplement containing calcium, a common feeding practice, the strontium 90 level in her milk may be 10 to 20 times less than that of the feed she eats.

With the possible exception of infants, a human body discriminates against strontium 90 in the same way. How effectively it passes it up depends on the amount of calcium in the diet. Because milk contains a sizeable quantity of calcium, only a small proportion of strontium 90 which may be in milk is deposited in the bones.

Of all foods, milk has been the focus of most attention because it is widely used as a test source for measuring fallout levels.

Milk is not tested because dairy products are contaminated to a greater degree than other foods, but because fresh milk can provide an index of the degree of total fallout in food.

Another reason for testing milk is that it is produced in all parts of the country and during all seasons of the year. All other foods are produced seasonally and regionally.

Because milk makes up a significant proportion of the diet, it is only natural that be used as a test source for radioactive elements, the specialist said.

Entomology and Economic Zoology.

INSECTS CONTINUE TO DEVELOP INSECTICIDE TOLERANCES

When a University of Minnesota entomologist, back in 1944, first used DDT to control the Colorado potato beetle, he little dreamed that within 10 years potato growers would again be asking for a more effective potato beetle control.

About the same time DDT did wonders to control houseflies--but within a few years DDT-resistant strains of houseflies developed. They are now reported in nearly every country of the world.

Today potato growers fight the Colorado beetle with dieldrin and other insecticides and new insecticides are continually developed to combat the housefly. But the resistance these and other insects continue to develop against certain types of insecticides poses a continual problem for researchers, according to Allan G. Peterson, University of Minnesota entomologist.

A present such a problem in Minnesota is enough to bring tears to your eyes. In the Anoka-Fridley area the onion maggot has developed a high degree of resistance to aldrin, dieldrin and heptachlor. In fields near Northfield and Hollandale these chlorinated hydrocarbon insecticides still give good control, but researchers say it is only a matter of time until onion growers in those areas must resort to other means of maggot control.

Peterson says insects develop resistance through differences in their genetic makeup and because "susceptible insects are continually weeded out by repeated exposures to insecticides."

Resistance is most likely to develop among insects restricted to a limited number of host plants, among insects that have several generations per year, and under conditions in which most of the insect population is exposed to insecticides.

Researchers expect to find increasing resistance in such insects as the cabbageworm and the cabbage maggot. On the other hand, they do not expect to find resistance developing in the potato leafhopper or the six-spotted leafhopper because both breed on a wide variety of host plants and because new populations of both come up from the South each spring.

Alternate use of different types of chemicals may help delay resistance, says Peterson. He urges growers to carefully follow current control recommendations and to report cases of apparent resistance to the University of Minnesota's Department of Entomology, St. Paul 1, or to their county agent.

CORN BORERS AND FUNGI TEAM UP AGAINST FARMERS

Corn borers and stalk rot fungi--one or the other is bad enough, but when the two get

together they make a devastating combination in a farmer's cornfield.

In fact, it now seems evident that fungi aid the borers in utilizing cornstalk tissue or provide the pest with some essential nutrient.

Entomologist H. C. Chiang and plant pathologist Roy Wilcoxson came to that conclusion after discovering that the presence of a certain strain of fungus in corn plant tissue brought about more rapid growth of corn borer larvae.

Corn borers are well known for the tunnels they bore in cornstalks--any farmer who has had a borer attack in his crop will tell you the pests can wreck corn yields. In severe borer infestations plants may not even produce ears.

In the past almost everyone thought tunneling injured the plant. Then Minnesota scientists mechanically bored tunnels in cornstalks--tunnels the size borer larvae would make--and found tunnels didn't affect yields nearly as much as expected.

Chiang and Wilcoxson figured the next step was to introduce egg masses of corn borer and stalk rot fungi into the artificial tunnels. In some they put egg masses alone, in some fungi alone and in others both borer eggs and fungi.

Not only did the larvae grow faster where fungus was present, but the amount of dead tissue in stalks infested with corn borer larvae was always greater than when stalks weren't infested.

Chiang and Wilcoxson say the problem now is to see how microorganisms influence the nutrition of corn borers.

While corn borer damage has eased off in recent years, the pests still cost farmers a lot of money. Last year's loss from borer damage in Minnesota is estimated at \$10 million. Damage from stalk rot fungi is even greater; plant pathologists figure the 1960 loss in this state alone may be as much as 10 percent of the crop, or around \$35. million.

RUFFED GROUSE SURVIVAL ABOUT EQUAL IN REFUGE OR HUNTED AREAS

Makes little difference whether a male ruffed grouse lives on a game refuge or in a hunted area--his chances for survival are about the same, according to a wildlife biologist on the University of Minnesota's St. Paul Campus.

William Marshall says research at the University's Cloquet Forest Research Center shows a 50 percent-per-year loss of established males in the 5-mile-square game preserve. Loss has been about the same in birds banded outside the area.

Big difference between refuge birds is that within the refuge the birds live into the winter and spring, then are taken by predators. Off the refuge most of the non-survivors are

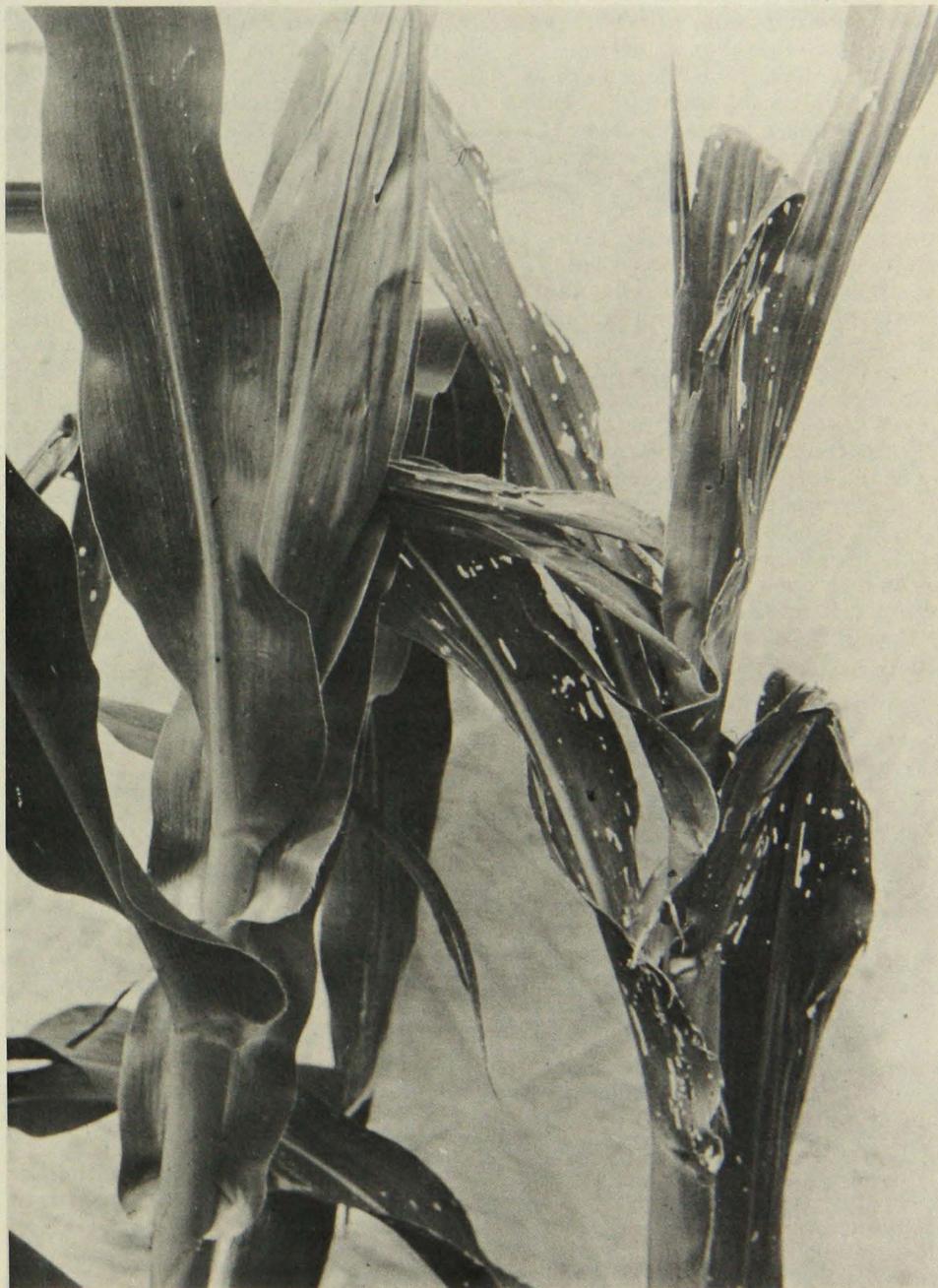
taken by hunters during the fall hunting season. Few birds in either area lived longer than 4 years.

The ruffed grouse--so called because of the black ruff of feathers on its neck--ranks next to the pheasant when it comes to upland game bird hunting in Minnesota.

Because extreme changes in the grouse population from year to year present a baffling biological problem and because welfare of the grouse depends on forestry and agricultural programs in northern Minnesota, Marshall and his co-workers have studied grouse habits at the research center for the past six years.

Each year researchers trap and mark all drumming male grouse at the center. A box trap with a mirror inside is put on the "drumming logs" where birds perform their mating display. The male grouse sees his reflection in the mirror, thinks he has competition, moves in to do battle--and is trapped. The birds are then banded, marked with colored tags on their backs, released and observed.

The adult male rarely goes over one-quarter mile from his drumming log but adult females and immature birds may move several miles in any one year, according to Marshall.



Pictured are two varieties of corn--one resistant and one susceptible to the corn borer. The resistant corn was developed at the University of Minnesota.

School of Forestry . . .

TREE GROWTH DEPENDS ON CARE AT ARRIVAL

Whether you're planting a single tree or miles of shelterbelt of windbreaks this spring, the care you give your planting stock upon arrival will have a lot to do with how well your trees survive and grow.

Parker Anderson, extension forester at the University of Minnesota, says the first thing to do when you pick up your bundle of trees is to pour fresh water into the package, before leaving town if you can. Nearly all trees come with their roots packed in moist moss to prevent them from drying. If trees have been several days in transit, chances are the roots have already absorbed all available moisture.

If you aren't going to plant for a few days, "heel-in" the trees in a narrow trench. Make the trench deep enough to take the entire root system and a part of the lower stems--but don't cover any branches. Make trench long enough to allow the bundled trees to be spread out in a thin layer. Then cover roots with soil and pack firmly so that all of the roots are in firm contact with the soil. Water as necessary to keep the soil moist. Trees may be left "heeled-in" for a week or so, if the job has been well done.

The best time of year to plant is just as soon as possible after the frost is out of the ground. Soil then is moist, the sun is mild and trees have an easier time establishing themselves. They have a full growing season ahead and can get a good start before weeds and grass become a problem.

MAPLE SYRUP HARVEST ONLY A TRICKLE OF POTENTIAL

Minnesota maple trees yielded 7,000 gallons of syrup valued at \$37,000 this spring, according to the State-Federal Crop Reporting Service and Parker Anderson, extension forester at the University of Minnesota.

This year's crop beat 1960 production by about 3,000 gallons, partially because of a 30-day sap flow this year compared with 19 days a year ago.

Despite the increase, Anderson says Minnesotans are harvesting only a trickle of the sap that's there for the tapping, and consequently thousands of dollars in potential income are lost each year.

Both Michigan and Wisconsin harvest several times as much syrup as Minnesota.

Maple syrup production for the U. S. this spring is estimated at more than 1 1/2 million gallons and valued at over \$7.2 million.

For the country as a whole this was the largest maple syrup harvest since 1957, the longest sap season since 1954.

RESEARCH SHOWS GOPHER IS "SCROOGE"

"Christmas? Bah! Humbug!" cried Gertie the Gopher as she gnawed away at a succulent young pine tree root.

University of Minnesota forestry researchers have unearthed evidence showing that the pocket gopher is a veritable Scrooge.

Pocket gophers cause serious losses in Norway and Scotch pine Christmas tree plantations by eating the roots of the trees. The extent to which they have killed Christmas trees has been the subject of a two-year study completed this fall by William Miles, extension forester; Henry Hansen, professor of forestry; and Laurits Krefting, U. S. Wildlife Service biologist--all with headquarters on the St. Paul Campus of the University of Minnesota.

Total mortality caused by pocket gophers on an average 10-year-old Norway pine plantation was 16 percent of the total trees planted, and total mortality caused by these rodents on an average seven-year-old Scotch pine plantation was 13 percent of the total trees planted.

Wide variations in the amount of damage among plantations were noted. These were due to differences in the number of pocket gophers present before planting, fluctuations in pocket gopher populations after planting and the absence or presence of other predators.

Of 26,000 trees studied, about 4 percent were killed by pocket gophers during 1960 and 1961.

Plantations where controls by poisoning has been diligently carried out indicated practically no pocket gophers present and negligible damage to the pine trees. A relatively new method of poisoning--a tractor-pulled machine called the "burrow builder"--has proved to be extremely effective in pocket gopher control, reported Miles. "Tree growers and plantation owners should recognize the risk of neglecting pocket gopher control," he said.

Information on pocket gopher damage and methods of control may be obtained from county agents and State Forestry personnel.

NORWAY AND SCOTCH PINE GAIN POPULARITY AS CHRISTMAS TREES

Balsam fir remains the number one choice of Christmas tree buyers in the Twin Cities area, but Norway and Scotch pine are gaining popularity fast, a survey by University of Minnesota foresters shows.

Balsam fir remained the favorite Christmas tree species in this market area in 1960, accounting for 48 percent of the purchases made by consumers. Norway pine was the second most im-

portant species, with 29 percent--doubling its share of the market since 1956. Spruce was third with 13 percent and Scotch pine fourth with 11 percent.

Results of the survey are reported by Henry L. Hansen and Richard A. Skok, professor and assistant professor, respectively, in the School of Forestry, and Marvin Smith, extension forester, at the University.

Comparison with data from a similar survey conducted in 1959 shows a large increase in the proportion of lots handling Scotch pine. In 1959, 40 percent of the lots handled Scotch pine. In 1960, 80 percent of the lots handled this species.

Over-all, about 11 percent of the trees obtained by retail lot operators were reported to be unsold at the end of the Christmas season. Many retailers considered 10 percent to be a normal ratio of unsold trees.

Balsam fir and spruce obtained by Twin Cities area retail lot operators were largely grown in Minnesota. Scotch and Norway pine were grown in about equal numbers within Minnesota and in other states.

Scotch and Norway pine were the most expensive trees for retailers to buy, but they commanded a higher dollar margin than balsam fir or spruce.



Plant Pathology and Botany . . .

WINTER GOOD TIME TO PRUNE FOR FIREBLIGHT

Winter is a good time to prune apple trees, both for fireblight control and for cultural purposes, says H. G. Johnson, extension plant pathologist at the University of Minnesota.

During the cold months, pruning can be done without bothering to disinfect pruning tools. Effective pruning out of fireblight-infected branches during the growing season requires chemical disinfection of pruning tools between cuts, says Johnson.

Fireblight is a bacterial disease that causes considerable damage to apple trees. During the summer infected shoots turn black and die. Leaves often turn a reddish brown after they die, and dead shoots bend over into a hook at the end.

Spray materials have not been highly effective in controlling this disease, according to Johnson. Severe infection is often present before control measures are applied, and by that time it is too late to do any good for the current season.

ELM TREES NOT DOOMED IN STATE

All elm trees in Minnesota are not doomed, in spite of the fact that the fungus which causes Dutch Elm disease has now been isolated in the state for the first time.

Losses can be held to a minimum if adequate control measures are established.

Here are tips from D. W. French, associate professor of plant pathology at the University of Minnesota:

Cleaning out dead elm material is a major step in reducing losses. In places where the fungus is present, spray programs should be planned for March and April.

In other areas, wilting elms should be checked to see if the Dutch Elm disease fungus is involved. Positive identification can be made only by culturing samples from the suspect tree in the laboratory. Branch samples 6-10 inches long and about 1/2-inch in diameter should be sent to the Department of Plant Pathology and Botany, Institute of Agriculture, University of Minnesota, St. Paul 1.

PLANT TISSUE CULTURE MAY HELP SOLVE CANCER RIDDLE

Plant tissue culture, a research tool being used by agricultural scientists on the St. Paul Campus of the University of Minnesota, may some day provide a clue for solving the problem of cancer.

This is brought out in a report by Richard D. Durbin, assistant professor, and A. J. Linck, associate professor, in the Department of Plant Pathology and Botany.

They explain it this way:

Tissue-culture--the growing in test tubes of cells from different parts of a plant, such as flowers, roots and stems--allows scientists to observe the cells in the controlled environment of the laboratory.

Tissue culture is proving valuable at the University in the study of crown gall, a cancer-like plant disease. This bacterium-caused disease is characterized by rapidly-multiplying cells which produce tumor-like galls on the plant.

In growing cells from the galls on tissue culture, scientists have found that the cells retain their ability to multiply rapidly and that their nutritional requirements differ from those of normal cells.

The University scientists hope to find out just how the bacterium is able to convert a normal cell into a tumor cell. Information gained from crown gall experiments may help animal disease researchers.

Plant tissue culture has also been found valuable in the study of rusts, mildews, some nematodes and viruses. Plant pathologists have found that stem tips are usually not infected with viruses. So, in order to stop the build-up of viruses, they culture the tips, which grow new plants. These can be propagated, starting a new virus-free stock.

LEAF WETTABILITY AFFECTS FLAX PLANT'S RESISTANCE TO PASMO

A flax plant's ability to resist PasmO disease depends a lot on the proportion of its leaves which are wettable, Ronald Covey, a University of Minnesota plant pathologist, reports.

Field tests have shown there is a type of resistance to PasmO which depends partially on the infectability of a variety, partially on leaf wettability and partially on the amount of inoculum produced on the variety.

PasmO, a fungus disease of flax, generally attacks late in the growing season, becomes most severe as the crop reaches maturity. It attacks stems, leaves and bolls.

Bolls may fall off the plant or seeds in the bolls may fail to fully develop. Infected stems often have alternate healthy and brownish areas, giving the plant a "barber pole" appearance. Yield loss in experimental plots due to PasmO disease has run as high as 50 to 60 percent.

Covey said the reason PasmO shows up late in the season is that leaves of young plants are water repellent, making it difficult for the fungus to become established. With age the cuticle, or waxy layer of plant cells, in flax may lose its water repellent quality, because of mechanical wear as leaves rub against other leaves and stems, and because of possible chemical changes.

Some varieties have a lower proportion of wettable leaves and thus are partially resistant

to Pasmó. For example, at full bloom only about 2 percent of the leaves of Marine are wettable, compared to 9 percent for Army and 21 percent for Redwood.

MINNESOTAN TELLS HOW APHID INCREASES ALFALFA DISEASE SEVERITY

How pea aphids, often called "plant lice," increase the severity of Blackstem disease of alfalfa is reported by Ernest E. Banntari and Roy D. Wilcoxson, plant pathologists.

When Blackstem-susceptible alfalfa was infested with pea aphids, 75 percent of the leaf

area was covered by lesions, compared with 60 percent on insect-free plants.

Aphids increased Blackstem on alfalfa stems to 15 percent as compared with 3 percent on insect-free plants.

The Minnesota scientists found that honey-dew, a sugar-containing secretion deposited on the plants by the aphid, increased Blackstem severity. Spraying insect-free plants with Blackstem spores suspended in honey-dew and water resulted in lesions on 25 percent of the leaf area, whereas only 5 percent of the leaf area was affected when plants were sprayed with spores in water. The honey-dew also caused symptoms to appear a day earlier.



Group of trees affected by the Dutch Elm disease. Elm bark beetles that had emerged earlier from the log in the foreground (a) may have been instrumental in carrying the disease to the now defoliated trees. Later in the season the elm on the left developed symptoms. The ash in the center is not susceptible to the disease. -- USDA Photo

Poultry Husbandry . . .

OIL TREAT EGGS ON THE FARMS?

Oil treat eggs on the farm?

Yes, it can be done satisfactorily and inexpensively by any producer as a means of preserving quality.

That's the word from Milo Swanson, associate professor of poultry husbandry at the University of Minnesota.

Says Swanson:

When eggs are oiled at the processor level, the principal advantage of oil treatment is to reduce evaporation. This, in turn, reduces growth in air cell size and weight loss.

And now it has been discovered that if oiling is done within a few hours after the eggs are laid, loss of carbon dioxide is retarded and characteristics associated by the consumer with freshness in the broken-out egg are retained.

Egg-treating oil is a highly-refined, light-weight white mineral oil, essentially colorless, odorless and tasteless. You can get it locally through most of the major companies selling gasoline and other petroleum products. Cost per gallon varies between 55 and 75 cents, the exact price depending on the quantity purchased.

For on-the-farm oiling, eggs may be gathered from the nests directly onto one-piece filler flats or may be placed on the flats at the time of oiling. Apply the oil with one of several kinds of sprayers.

The least expensive sprayer is the hand pump type used for insecticides and disinfectants. It should have an adjustable spray nozzle and deliver a continuous rather than an intermittent discharge. Pressure sprayers of larger capacity are also available. Electric sprayers originally designed for paints have been found satisfactory, and aerosol dispensers are also on the market for the small producer seeking convenience of application.

University of Minnesota research shows that delaying treatment beyond 24 hours after laying nullifies most of the potential benefit. On the other hand, a very complete seal application within an hour or two of laying can produce trouble from "cloudy whites." But, normally the spray process does not give a complete enough seal to bring this about.

The University of Minnesota poultry husbandry department recommends that the eggs be placed in the cooler as they are gathered during the day. Apply the oil at the end of the day, following any cleaning procedure used. If the oiling isn't completed at this time, it should be done the first thing the next morning.

Coverage of three-fourths or more of the shell surface is required for the treatment to be effective. Two grams of oil per 30-egg flat gives proper protection under refrigerated holding conditions. At this rate one gallon of oil would be enough to treat about 4,000 dozens of eggs or 133 thirty dozen cases at a cost for materials of about one-half cent per case.

Oiling eggs shouldn't be regarded as a substitute for proper refrigeration--use both for best results.

Before you adopt oil treating, consult with your egg buyer. Not all markets will accept oil-processed eggs.

HENS DO WELL ON CORN MEAL WITH AMINO ACID SUPPLEMENT

If someone says a laying hen can get along with only a corn meal diet, don't believe him.

But if you supplement the corn meal with the right amount of essential amino acids, it appears that hens are able not only to maintain egg production but also to keep up body and egg weights at the same time, according to University of Minnesota poultry researchers.

P. E. Waibel, R. C. Fitzsimmons and D. C. Snetsinger report:

The problem in compounding a poultry ration is to get all the amino acids--tiny nitrogen-containing molecules often called "the building blocks of protein,"--in proper balance. Too much of any one amino acid can reduce performance--or produce a deficiency of some other amino acid.

On a corn diet without amino acid supplement, hens in Minnesota trials lost body weight in a few days and dropped considerably in egg production. When the corn ration was supplemented with amino acids at minimum suggested levels, hens came close to top egg production but maintained neither egg nor body weight.

But when levels of essential amino acids were increased by 25 percent over the recommended minimum, hens were able to maintain both body and egg weights and good egg production.

By learning how to supplement a low protein ration such as corn with amino acids, the researchers hope to gain a greater knowledge of a hen's amino acid requirements.

This approach may lead to the ideal amino acid pattern required in a corn supplement and provide greater accuracy in evaluating soybean oil meal and other commonly used protein supplements in terms of their amino acid contributions.

STUDY OF AORTIC RUPTURE IN TURKEYS REPORTED

Research that may lead to greater knowledge and more effective control of aortic rupture, an internal bleeding disease of turkeys, is reported by University of Minnesota poultry scientists.

L. M. Krista reported trials with several lots of 10-week-old male turkeys in which he and his co-workers observed a 20 percent loss from aortic rupture during a 5-week period. The re-

searchers believe their trials are the first to produce so great an incidence of the disease under closely controlled conditions.

Krista reported that half the birds in each lot had been implanted with a small pellet containing diethylstilbestrol (DES).

In confirmation of an earlier field experiment, DES increased the incidence of rupture in the present experiment by more than 60 percent, and birds receiving a chemical known as beta-aminopropionitrile (BAPN) showed an even greater death loss.

But the incidence of death loss in one lot of birds injected with testosterone was reduced 75 percent.

Various fat and protein levels in the corn-soybean type diet were without effect in the experiment so far as death loss was concerned. Increasing the protein level appeared to increase blood pressure, and high fat and high-fat-plus cholesterol appeared to decrease blood pressure slightly. Testosterone didn't affect blood pressure, but DES decreased blood pressure by 16 percent.

Aortic rupture has hit many turkey flocks in recent years, often causing heavy losses. It occurs when one of the large blood vessels near the kidney breaks, but the actual cause of the rupture isn't known.

Until about a year ago there was no effective treatment, but a tranquilizer called reserpine has, in many cases, helped reduce losses from the disease.

PURIFIED DIET FOR TURKEYS AIDS U OF M RESEARCH

A purified diet for turkey poults which uses a mixture of synthetic amino acids as a protein source has been developed by University of Minnesota poultry scientists.

D. C. Snetsinger, P. E. Waibel and R. C. Fitzsimmons report that growth of poults receiving the purified diet has been about 75 percent of that of poults fed a standard diet using soybean meal as a source of protein.

The researchers tested a number of amino acid mixtures prior to the successful performance of a mix based on the amino acid composition of whole chicken egg.

Amino acids--the "building blocks" that make up proteins--are needed by all animals for growth and health. Animals can get them in two ways. First, digestive enzymes in the body can break down intact proteins, such as soybean meal. Second, amino acids can be synthesized in the laboratory--and it's the synthetic amino acids which the purified ration contains.

The purified diet is the first reported in which near-normal growth rates have occurred. It is important as an assay diet for use in turkey poult nutrition research because it permits researchers to vary extensively the individual amino acids in a bird's diet--an impossibility when a whole protein source is used.

The purified diet may help scientists identify the effect of the so-called "unknown growth factors," and also help give a closer check of a poult's true amino acid requirements. These are presently uncertain because researchers can't vary amino acid content in natural protein sources enough to study different effects.

FULL-FAT SOYBEAN MEAL MAY BE IMPORTANT PROTEIN-ENERGY SOURCE

The day may not be far off when full-fat soybean meal becomes a combination protein-energy source for poultry, according to a University of Minnesota poultry researcher.

Paul Waibel said it appears the fat in the whole soybean will be of considerable help in improving nutrition for poultry.

Including more fat in a bird's diet by using whole soybeans results in higher energy feeds. Waibel says research has shown that growing chickens and turkeys, and in some cases mature birds, perform at a higher rate and utilize their feed more efficiently when they are fed high-energy diets.

A possible disadvantage of feeding full-fat soybeans is that carcass fat tends to become softer or unsaturated, according to recent studies at Purdue University. This may be a disadvantage as far as present carcass acceptability goes, but nutritionists are attempting to increase the amounts of unsaturated fatty acids in human diets. That could provide a compensating advantage.

There's more to feeding a full-fat ration than simply grinding up soybeans and dumping the meal in a poultry feeder. Poultry and animals with simple stomachs can't utilize the raw soybean protein. The beans must be heat treated during processing to take advantage of their full nutritional value.

Heating ground soybeans doesn't release all of the energy. Present indications are that the beans must first be made into thin flakes. That results in improved digestibility of the oil. How the heating is done is important; one method is to heat the flakes for 30 minutes at 225 degrees.

Waibel says, however, a recent Cornell University finding indicates that the flaking step may be omitted if the final ration is pelleted.

The final full-fat soybean product contains about 37 percent protein and 18 percent fat.

RESEARCHERS REPORT STEPS TO IMPROVE MARKET EGG QUALITY

A further step toward improving the quality of market eggs has been reported by University of Minnesota poultry researchers.

Many egg producers now use processing oil in addition to natural and mechanical refrigeration to increase the keeping quality of eggs. The oil seals shell pores and prevents escape of

natural carbon dioxide. But sometimes oil-treated eggs showed cloudy whites when a housewife broke them into a skillet.

What's really involved is the alkalinity level of the egg albumen (white), and that's affected by storage temperatures and how long after gathering an egg is oiled, according to G. W. Froning and M. H. Swanson.

Albumen in a fresh egg is only slightly alkaline, and is responsible for the cloudy white condition. As the egg ages slightly, carbon dioxide escapes and alkalinity increases to a point where cloudy whites are no longer a problem.

The oil treatment, however, traps carbon dioxide in the egg and keeps alkalinity below the critical level.

In trials to determine the most desirable time of oiling and the effects of holding tempera-

tures before and after the oiling process, both the spraying and oil dipping processes were used. Two levels of storage temperatures, 32 and 55 degrees, were studied.

Following holding periods of 15 and 30 days the researchers broke out the eggs and measured the height and acidity of the whites, the cloudiness score and the percent of outer thin white. Results suggest that eggs which were oil sprayed and held at 55 degrees may be treated immediately after gathering without serious adverse effects. When the oil dipping process was used, delaying the treatment 8 to 12 hours proved beneficial.

At a storage temperature of 32 degrees, cloudiness scores were high for all oiling treatments, and delaying the treatment had no effect. At the lower temperature even many of the un-oiled eggs had cloudy whites.



Rural Sociology . . .

POPULATION LOSS AFFECTS EVERYONE

Although Minnesota's population increased by 14.5 percent from 1950 to 1960, 36 counties in the state showed a population decline. That's despite the fact that during the decade farm and village families reared 60 to 80 percent more children than necessary to maintain their population.

Is the out-migration good or bad--and how does it affect a community? Marvin J. Taves, supervisor of rural sociology at the University of Minnesota, says it's a two-sided affair. It may reduce the pressure on available resources --or it may weaken the social institutions and business community and further weaken a community's appeal.

Data from 13 northeastern Minnesota communities support the pessimistic view, according to Taves.

Taves estimates that more than one-half of the members of graduating classes in high schools of the small towns left within 3 years after graduation to take technical training, get a college education or get a job.

This out-migration tends to reduce family contacts between generations. Family tradition and values are passed on less effectively when close contact between grandchildren and grandparents is broken.

On the other hand, out-migration of some family members broadens the remaining members as those who leave report back on their experiences. This forms a tie between different localities and social groups which presumably leads to better understanding and more common interests--and in turn to greater unity.

There is a cost approach to the problem, too. The youngster who leaves his community at age 18 should be worth at least the cost to rear him. The loss of his potential earning power to the community is estimated at about 5 to 10 times that sum.

However, to support the youngster in his home community could result in even greater social and welfare costs. Looking at it that way, out-migration may well be the lower financial and social burden.

Although the out-migration of youth is more spectacular, older persons have also been leaving, mainly because of consolidation of farms and businesses and declining employment in agriculture, mining and other industries.

Results of their leaving differ considerably from those of youths, according to Taves. Older persons presumably have already been an economic and social asset to their communities. They have contributed to its total production, saved money and gained experience--which they largely take with them. They also remove the demand for products their family would purchase in the community.

Advantages are that their out-migration reduces the conservatism that may hold back

community improvement and the demand of services for the aged. It also opens opportunities for leadership and employment of others.

Taves says there's no doubt that a community becomes a less desirable place to live when the out-migration prevents it from growing so it can successfully compete for the professional services of doctors, teachers, ministers and others and provide the expected improvement in stores and utilities.

Current studies indicate this out-migration may become a self-generating cycle that only concerted action can break. Serious investigation considering the well being of the local community, the state and the nation will be needed to guide any decision to encourage or discourage population redistribution, according to Taves.

SOCIAL ADJUSTMENT OF AGED NOTED BY U SOCIOLOGISTS

Activity in marital, social organizational, leadership and work roles contributes to good social adjustment among persons over 65, according to a pair of University of Minnesota sociologists.

Marvin J. Taves and Gary D. Hansen said upper Midwest regional studies show 70 percent of the married but only 55 percent of the widowed over 65 to be well adjusted; and higher proportions of married persons than those single, divorced or separated are well adjusted.

Leadership which involves holding office or serving on a committee is strongly associated with good adjustment--fully 93 percent of such leaders over 65 were well adjusted as compared to 75 percent among non-leaders.

Good personal adjustment as measured by the study involves such things as feeling good about one's health, enjoying a number of close friendships, satisfaction with work, finding security or comfort in religion, feeling useful and being relatively as happy as in earlier years.

Persons who think of themselves as middle aged have better adjustment scores than those who say they are elderly or old, the researchers reported. Those who feel they are in good health and those who feel they have enough income to live comfortably also tend to be well adjusted.

Factors which appear less important to personal adjustment after age 65 are urban or rural residence, sex, age and the actual living arrangement.

SOCIAL SECURITY GIVES FARM PEOPLE INDEPENDENCE

Increased independence and freedom, greater emotional and financial security and more participation in community affairs are some of the benefits social security is reaping for its beneficiaries in rural communities.

A study made by Marvin J. Taves, associate professor of rural sociology, and Gary D. Hansen, research assistant in the Department of Sociology at the University of Minnesota, shows that social security is having an important impact on rural living. Interviewed were 300 men and women--mostly men--who earned at least part of their social security coverage through farming.

The feeling of security was increased for one in five by the monthly retirement check, which, the recipients said, was something to depend upon so they could plan accordingly. One person in 10 reported fewer worries and a life more comfortable and pleasant because of social security.

Two out of every three individuals found that social security made it possible for them to remain self supporting. The monthly payments freed one in five from dependence upon their children for support.

Time for recreation and creative activities was another benefit of social security. Four in 10 beneficiaries found it possible to be more active in social organizations, activities and community affairs.

Earlier retirement was possible because of social security for one in five persons in the study, though 4 percent said it caused them to retire later. By retiring earlier, the 20 percent created vacancies for younger farmers. In this way social security increases the opportunity and freedom of younger farmers to establish themselves in farming at an earlier age, the University sociologists point out.

Some younger farmers were disturbed that older farmers became beneficiaries so rapidly and inexpensively. However, for themselves they wanted earlier retirement and higher social security benefits. Many younger farmers not yet beneficiaries suggested that the age for receiving retirement benefits should be lowered to about 60.

ACCEPTANCE-REJECTION OF NEW PRACTICES STUDIED

Why do some farmers adopt a new farm practice while others reject it? How are acceptors (those who adopt a new practice) and rejectors (those who don't) alike--and how do they differ?

Ronald G. Klietsch, George Donohue and Marvin Taves, rural sociologists at the University of Minnesota, recently studied the change to bulk tank milk handling by a sample of farmers in a north central Minnesota county. Of 195 farmers interviewed 66 would adopt bulk tanks; 129 would not.

The study turned up some surprising results. For one thing, the popular notion that education is important in distinguishing acceptors of a new idea from rejectors didn't hold true. Although studies in other states involving other practices have found education important to the acceptance process, the findings here show no difference between educational levels of the acceptors and the rejectors.

Another generally accepted belief is that the more active one is in the community, the church and other organizations, the greater the likelihood that he or she will accept new ideas. But the study generally showed no outstanding differences between acceptors and rejectors in their degree of community and church participation. Rejectors appear as active socially as acceptors.

Age had some relation to the findings. Acceptors were generally younger, averaging just over 41 years old, while rejectors averaged over 47 years of age. A greater number of acceptors were between the ages of 30 and 34 while more rejectors were in their 60's, possibly near retirement.

Age difference is important in accepting a practice such as bulk tank milk handling, the researchers point out, because of the time it takes to pay for a bulk tank installation costing \$1,800 to \$3,500 or more. And it appears that older farmers have little interest in making a long-range investment for one of the sons who may or may not wish to take over the farm.

Acceptors tended to have smaller families and younger children than did rejectors. But whether a farmer had more sons than daughters had little effect on acceptance. In fact, more rejectors than acceptors had two sons and more acceptors than rejectors had two daughters. Adoption didn't appear to be related to any traditional father-son relationship.

Also, acceptors appear to be in an earlier stage of family development than rejectors and have fewer and younger children--but not more children still at home--than rejectors.

The researchers found a sound relationship between herd size and acceptance of the new practice. Acceptors had significantly larger herds than rejectors--usually over 20 cows--while rejectors generally had herds under 20. Acceptors also operated larger farms than rejectors, between 180 to 219 acres, while more rejectors operated less than 100 acres. The amount of rented land was about the same for both groups.

Acceptors showed more careful farm management practices than did the rejectors. Acceptors, indicating a commercial attitude in their farm operation, used balance sheets and other record forms to a greater extent. Rejectors more often relied on bank receipt books, check stubs and sales slips as a basis for their records.

Acceptors also had larger gross incomes than rejectors. Most rejectors claimed gross incomes of \$2,000 to \$4,000; most acceptors claimed gross incomes over \$8,000. This seems to indicate that adoption is associated with availability of income for farm improvements and investments.

When the farm operators were asked under what conditions they would quit dairying, rejectors cited a wide range of conditions and possible changes in dairy requirements that would influence their decision. Acceptors, on the other hand, were less specific and were inclined to cite the "possibility of the unexpected" in general terms as a basis for which they would leave dairy farming.

Safety...

CHORE-TIME "SNAKES" ACTIVE ALL WINTER

Chore-time farm hazards are "snakes in the grass" which, unlike the real reptiles, do not hibernate in winter.

This warning comes from Glenn Prickett, extension farm safety specialist at the University of Minnesota.

The deadliest of these hazards include the sneaky "sidewinders" that lurk around moving belts, revolving shafts, elevator augurs, silo unloaders, buzz and chain saws.

Those who approach these power driven machines unarmed by caution stand to lose limbs or lives as quickly as any rattlesnake can strike, Prickett points out.

Almost as vicious are the "vipers" such as shovels that trip you, pitchfork tines that penetrate your hand or leg, fork handles that impale you and axes that strike a glancing blow against your leg or foot.

Ways to protect yourself against chore-time hazards which lie waiting to strike without warning include shields for belts, shafts and augurs, careful handling and storing of tools in racks out of the haymows and feed alleys, says Prickett.

Falls, one of the biggest causes of farm work accidents, are more frequent during the winter months. Places where these "coiled cobras" most often lurk are on icy paths and work areas, silos, haymows, bale ricks, granaries and unsteady ladders.

Weapons against falls include care in entering and leaving the silo, caution on ladders, keeping work areas clear of snow and ice, building a frame around the entrance to the haymow and removal of bales from unsteady ricks.

"Think, slow down and move safely in doing farm chores," Prickett urges.

THE CORNSTALK AND YOU-- PICKER CAN'T TELL DIFFERENCE

The mechanical corn picker doesn't know you from a cornstalk.

Mix that chilling thought into your dreams of golden harvest, and you may be alive and in one piece when the time comes to add up the yield--a corn picker is just as willing to pick a life or a limb as an ear of corn, says Glenn Prickett, extension farm safety specialist at the University of Minnesota.

Prickett makes these suggestions for those who would emerge intact from corn harvest this year:

1. Check picker for good repair and adjustment for field conditions.
2. Shut off power before dismounting from the tractor.

3. Completely stop picker before lubricating, adjusting and unclogging it.

4. Keep protective shields in place on all machines.

5. Keep children off and away from wagons and machines when in operation.

6. Use metal sediment bulk under carburetor, especially on mounted picker and check for leaky fuel line.

7. Carry an approved fire extinguisher on tractor.

8. Wear snug fitting clothing and use only one thumb gloves or mittens when operating picker.

9. Stop tractor and set brakes before hitching to wagons and other implements.

10. Slow down - think - then work at safe speed.

11. Keep alert - take a lunch break a. m. and p. m.

SILO GAS POSES POTENTIAL THREAT

Few states have lethal gas chambers, but thousands of Minnesota farms do. Silos filled with fermenting corn silage are potential producers of nitrogen dioxide, a deadly silo gas.

The danger period occurs shortly after and for about 10 days following filling as the fermentation process takes place, according to Glenn Prickett, extension safety specialist at the University of Minnesota.

You can sometimes tell a heavy concentration of silo gas by its characteristic reddish-brown to yellow color. Don't count on color for a warning though. Silo gas isn't always visible when concentrations are light but dangerous.

Symptoms of exposure to the deadly gas include an irritating odor, coughing, pain and difficulty in breathing. Prickett says a person who feels these effects after entering a silo or working around the silo area should contact his doctor at once.

With silo gas as with many other farm dangers, a little prevention is worth a lot of cure. Prickett says a few simple precautions will largely eliminate danger of silo gas poisoning.

* Provide for good ventilation around the silo and feeding room during the fermentation period. That's generally until about 10 days after filling.

* Stay out of the silo during the fermentation process. If you must re-enter, run the blower for several minutes first to drive gas accumulations away. That's especially important if you refill.

* Enclose the area around the base of the silo with crib fencing to keep children, livestock and poultry away from the area. Silo gas is heavier than air and tends to settle around the silo base.

Soils . . .

HIGH ANALYSIS FERTILIZER SAVES MONEY AND LABOR

Minnesota farmers could ease the strain on their backs and drain on their pocketbooks by using high analysis fertilizer in preference to low analysis material, says Merle Halverson, extension soils specialist.

He submits these facts for the consideration of farmers who may wish to start making plans for next year's fertilization program on the basis of this year's experience:

During the 1959-60 fertilizer season, farmers in the state dropped over \$189,000 by using 4-16-16 and 5-20-20 grades instead of 6-24-24 (all three grades have a 1-4-4 ratio of plant food ingredients).

The reason for the higher cost of lower analysis fertilizers lies in transportation. It has been estimated that fully 20 percent of the cost of mixed fertilizers in Minnesota can be assigned to transportation charges. Buying higher analyses means that more actual plant food per pound is transported and that fewer total pounds have to be carried to and within Minnesota to do a given fertilizing job.

In 1959-60, Halverson reports, 4-16-16 sold for \$1.88 per unit (20 pounds of actual plant food); 5-20-20 for \$1.66 and 6-24-24 for \$1.62 per unit. Minnesota farmers used 3,926 tons of 4-16-16 and 84,700 tons of 5-20-20 in 1959-60.

If the per unit cost of plant food in these amounts were reduced to the \$1.62 per unit, paid for the plant food in 6-24-24, the saving would have been about \$189,000.

"There are plenty of other fertilizer ratios that are built in more than one grade. In many cases, the higher analysis grades cost less per unit or per pound of actual plant food," according to Halverson.

He also points out that by using the high analysis, Minnesota farmers in 1959-60 would have been able to apply the same amount of plant food with 15,400 tons less of fertilizer--"so the saving is on the back as well as on the pocketbook."

PROPER FERTILIZER PLACEMENT PREVENTS CORN INJURY

Put your corn fertilizer in the right place and you'll have no problem with injury to the plant, regardless of the amount of each nutrient in the fertilizer and the application rate per acre, says Paul Burson, professor soils.

The main thing is to see that no fertilizer comes in contact with the seed. That's especially true today with new high analysis mixed materials which are usually prepared from ammoniated phosphates, according to Burson.

Band placement of fertilizer for corn does not cause injury to germination, regardless of the type of ingredient used. However, when such fertilizer comes in near contact with corn seed planted with splitboot planters, or when the fertilizer is placed with the seed, severe injury to germination occurs, he pointed out.

Burson said an application rate of 40 pounds per acre of potash applied with a splitboot planter has reduced yields almost four bushels per acre from fertilizer contact injury in 1960 and 1961 trials at the University's Rosemount Agricultural Experiment Station.

These trials showed the most effective fertilizer use when all nitrogen, phosphate and potash were applied as a starter fertilizer, rather than part as a starter and part as a side-dressing.

Burson said that as new fertilizer materials come on the market and farmers use heavier application rates, it is more important than ever to use the proper type of equipment to avoid contact injury.

PASTURE FERTILITY TRIALS REPORTED

Renovation and 200 pounds per acre of 33-0-0 and an equal amount of 0-20-20 fertilizer more than doubled beef production per acre at the University of Minnesota's Rosemount Agricultural Experiment Station.

That report comes from Paul M. Burson, University soils researcher.

Total production of beef per acre ranged from 171 pounds on unfertilized pasture to 385 pounds on fertilized renovated pastures. The fertilized and renovated pastures also gave the greatest beef return per acre over seed, tillage and fertilizer costs--\$70.70 per acre compared to \$53.20 for fertilized but unrenovated pasture and \$37.62 for unfertilized pasture.

Renovated and fertilized pastures carried nearly twice as many steers as the unimproved pasture.

Applications of nitrogen fertilizer not only boosted yields but also increased the percentage of grass in the pasture compared with the percentage of legumes. That may be important when it comes to controlling bloat, Burson said.

Best time to apply the nitrogen fertilizer depends to some extent on the amount of rainfall after it is spread. Burson noted that forage yields per acre were greatest where half the nitrogen was applied in April and half in July, but yields from pastures which received a single nitrogen application followed so closely that he feels split application isn't worth the extra cost.

The soils specialist recommended grazing down the lush early spring pasture growth and applying a single annual application of nitrogen fertilizer in June. July applications of nitrogen are risky because there's greater chance of dry weather than, he said.

Renovated pastures were worked three times with a deep tiller and once with a disk. Seeding rates were 5 pounds of alfalfa, 6 pounds of Lincoln brome, 2 pounds of orchard grass and 1 pound of alsike clover per acre.

Cooperating with Burson in the trials were University of Minnesota agronomist A. R. Schmid, and A. L. Harvey and O. E. Kolari, animal husbandmen at the University.

UP TO SIX TO ONE RETURNS FROM FALL LIMING

How'd you like to bet on a sure thing and get 6 to 1 odds? You can do it handily in Minnesota.

If you farm anywhere in the state except the western two or three tiers of counties, chances are that you'll get back \$6 for every \$1 you invest in lime for your soil.

Soils men at the University of Minnesota say lime is the first requirement to be met in establishing a sound soil fertility program. Most eastern Minnesota soils have a natural tendency to become more acid.

Acidity results from the removal of calcium and magnesium and the resulting increase of hydrogen in a soil. The process is favored by Minnesota's climate and stepped up by cropping. Young legume plants that lack calcium--alfalfa and sweet clover, for example--are easy victims to winter killing and summer drouth.

Liming replaces the calcium and magnesium which have been removed from the soil to balance the hydrogen accumulation. This helps to satisfy the nutritive requirements of the crops as well as to correct the acidity--but only about one Minnesota farmer in twelve sees to it his soil gets the lime it needs.

Soils differ considerably in their needs for lime. Climate, parent material, vegetation and cultivation all have something to do with the extent of the acidity. The only way to tell how much lime your soil needs is with a soil test from a reliable soil testing laboratory.

Sample your soil now and send it to the University of Minnesota's soil testing laboratory. Do it early and you'll have the results in time for fall liming. That's especially important on fields where you'll sow legumes next spring. See the county agent for more information.

MINIMUM TILLAGE PROVES PROFITABLE

John Schwartzau tried a new idea called minimum tillage on his rolling, terraced 213-acre Goodhue County dairy farm four years ago. That idea, combined with a switch from dairying to a corn-hog-beef enterprise, has changed his whole farming operation.

Today there's not a dairy cow on the place. The only terraces that remain are on a 25-acre hayfield that has been in alfalfa for several years. The rest of the farm is planted to corn grown with minimum tillage--the least possible field-work--on the same field year after year.

A few years ago Schwartzau was looking for a way to cut down on labor and still make the best possible use of his farm. By production standards, his dairy operation was a success--his DHIA herd average ran well above 400 pounds of fat.

But Schwartzau's rotation system wasn't giving the forage yields he expected, and the cows took long hours of care 365 days every year.

The turning point came with a 5-inch cloudburst just after corn planting in the spring of 1957. As he sloshed across the pasture behind his 47 Holsteins that muddy May morning, Schwartzau noticed how the downpour affected his fields.

Nearly everywhere he looked water spilled over the terraces and moved freely across pasture and hayland. But on a small area back of the barnyard all of the rainfall was soaking in. There wasn't a sign of runoff.

Schwartzau had planted that field only a few days before, using minimum tillage. He'd simply hooked a drag behind his plow and followed the plow with his corn planter. The idea of adopting minimum tillage didn't excite him; in fact he didn't particularly care if it worked. Later that summer he planned to take dirt from this knoll for barnyard fill, and weeds or corn, whichever grew, would be removed anyway.

The corn on that hillside outgrew the weeds that summer, and next spring Schwartzau planted 100 acres to corn, using minimum tillage. When the corn came up he went over the fields with a rotary hoe and, later, once with a cultivator. "Best corn I ever grew," he says.

That fall, convinced he could save time and labor by switching to a corn-hog-beef operation, he closed his milking parlor, sold his dairy herd and planned a cropping program of continuous corn using minimum tillage.

By 1960 Schwartzau had over 180 acres planted to corn. He plows his Fayette-type soil

about 9 inches deep, plants about 3 inches deep and plans for a surviving plant population of 16,000 plants per acre. After trying both drilling and hill dropping, he favors drilling one kernel every 8 inches. "Drilling usually gives a better stand, and drilled corn shades the ground more and gives better weed control," he says.

He prefers spring plowing to fall plowing because it saves a trip across the field. And though most farmers using minimum tillage plant in the wheel tracks, Schwartau plants between the tracks. "Weeds come up faster in compacted soil, don't bother much where the ground is loose. So I let them come up where I can get at them with the cultivator," he says. He still controls weeds with a single cultivation.

Although slopes on his fields run as high as 8 percent, water erosion hasn't been a problem. With minimum tillage, soil tilth has improved so greatly the fields blot up the rain as fast as it falls.

Schwartau fertilizes according to soil test results and takes soil samples every two years. Last year he spread 200 pounds of bulk 0-0-60 muriate of potash per acre--this is done at 3-year intervals--applied 55 pounds of actual liquid nitrogen before plowing, and put on 140 pounds of 9-36-0 at planting time. To spread the harvest he plants hybrids maturing in 94 to 107 days. His 1960 yield, down a bit because of the unusual season, and a planting delay due to illness, he estimates at 85 bushels per acre.

What's in the future for farmer Schwartau? Not much change as far as corn is concerned. The switch to drill planting--maybe an experimental application of heptachlor on one of the oldest fields this year to see if rootworm control might prove profitable. He'd like to try a 5-bottom plow with a 2-row planter attached to handle tillage and planting in one trip across the field, but hates to give up using his 4-row cultivator.

Now feeding about 500 hogs and 120 head of cattle per year, he plans to increase farrowings to about 700 pigs in order to feed out most of his corn.

Some doubt the future of minimum tillage and continuous corn. "The weeds will take over the fields," they say. But Schwartau isn't worrying about that. "I don't expect much trouble," he says thoughtfully. "The best weed control yet is a good stand of corn. Besides we're keeping the rain where it falls, and erosion is no longer a problem."

TRACE ELEMENT NEEDS IN MINNESOTA SOILS DISCUSSED

Instances of a proven need for the addition of trace elements to Minnesota soils have been comparatively few, a University of Minnesota soils specialist pointed out today.

Trace elements include boron, copper, molybdenum, zinc, iron, manganese and chlorine.

J. M. MacGregor, professor of soils at the University, suggests that farmers experiment on small field areas to determine whether or not trace elements are needed. But he warns that weather conditions during each growing season may greatly affect results.

Speaking for the University of Minnesota Agricultural Experiment Station, MacGregor says that it is not possible to locate experiments or to test soils on every field in all parts of the state--and soil nutrient needs vary widely, even within each field. "Therefore, it is impossible to make definite statements on the exact nutrient needs of each soil for each crop grown, and only generalizations are justified," he says.

MacGregor makes the following comments with respect to each of the trace elements:

Boron--Sprays have been beneficial on rutabagas grown in Pine County for at least 30 years. While isolated alfalfa plants in several locations of the state have indicated possible boron deficiency, it was not until 1960 that considerable areas of alfalfa in Aitkin, Mille Lacs and Kanabec counties began to show some boron deficiency symptoms.

A wet spring followed by a dry summer was especially favorable for this development in 1960. Transverse (crosswise) cracking of celery stems growing on some peat soils--characteristic of boron deficiency--has been observed occasionally.

On most Minnesota soils, however, applying boron has been of little advantage in crop production.

Copper has not been noticeably beneficial to crops on Minnesota soils.

Molybdenum, used in limited field or greenhouse experiments, on alfalfa has failed to produce beneficial growth effects.

Zinc--Treatments on corn, oats, alfalfa and some horticultural crops have shown no noticeable effect on plant growth prior to 1960. Zinc deficiency of corn was observed on scattered low spots of high lime soils in west central Minnesota in 1960. These areas were small and were not important in 1961.

Iron deficiency is frequently observed in late June on some varieties of soybeans and on flax growing in spotted areas of high lime soils in western Minnesota. Many horticultural species and trees and shrubs are also affected with this yellowing (chlorosis) of the foliage. This may be corrected with repeated dilute iron sulfate sprays. The application of some forms of chelated iron such as APCA-Fe to the soil adjacent to the affected plant roots has also been highly effective but not economical on field crops.

Manganese deficiency has been reported in one experiment with onions growing on peat soils near Hollandale in Freeborn County.

Chlorine--No deficiency of this element has been reported, and it is added as a constituent of most potash fertilizer sold in Minnesota.

FERTILITY LEVEL GREATLY AFFECTS ALFALFA SURVIVAL

The lime and fertilizer you put on your alfalfa fields this fall may have a lot to do with your stands and yields in 1962. And fall soil testing can mean the difference between survival and failure in your alfalfa fields.

Meeting the exact fertility need is more critical for alfalfa than any other crop, according to Lowell Hanson, extension soils specialist at the University of Minnesota. If alfalfa doesn't come through the first winter you've lost your whole investment in seed and preparation.

Fertility is a must for alfalfa stands and high yields. In one survey of farmers, unfertilized fields showed an average stand reduction of 18 percent. Fertilized fields had only a 9 percent plant loss.

Individual fields low in fertility often have no alfalfa stand at all the second year, unless they get fertilizer and lime. Potash is important in saving stands--soils in central and north-east Minnesota often need 200 pounds of 0-0-60 each year.

Both phosphate and potash make a big difference in alfalfa yields. In Lake of the Woods County, on the Hanson and Stone farm near Baudette, adding phosphate on demonstration plots boosted yields from the first two cuttings in 1961 by 2.1 tons per acre. Adding potash along with phosphate meant another 400 pounds of hay.

The Lake of the Woods County tests were on low-phosphorus, low-potassium soil.

Alfalfa is a high-yielding crop when soil is ready for it. It's also a hungry crop. Four tons of alfalfa hay need 180 pounds of nitrogen,

40 pounds of phosphate, and 180 pounds of potash. With a good fertility program based on soil tests, the extra plant food you add can mean \$30 to \$50 worth of high quality livestock feed per acre each year.

TODAY'S SOIL TESTS MOST RELIABLE

Today's soil tests are considerably more reliable than those available a few years ago. That's because research is continually going on to improve the accuracy of the tests.

University of Minnesota soils men John Grava and Lowell Hanson conducted field research plot trials in southeast Minnesota to calibrate tests and fertilizer response more closely.

One of the best methods of checking soil test results is to see how much of a nutrient such as potassium gets into the plant.

For example, on one of the five fields being studied Hanson and Grava found that a relatively low test supplied only 60% of the potassium needed for normal growth of corn.

The Fayette soil of this field required an application of 120 pounds of potash to bring the potassium up to the proper level in the plant.

These results, along with other studies conducted by the soils department in Minnesota and other states, make possible continued adjustment of fertilizer rates for different crops and soils.

But in order to take advantage of this information, farmers must collect soil samples and send them in for testing. Sound recommendations for each field can then be made. Supplies for sample collection are available from the county extension office or many fertilizer dealers.

College of Veterinary Medicine . . .

"HUMAN ERRORS" CAUSE DAIRY COW FERTILITY LOSSES

Much of the tremendous cost of infertility in milk cows can be traced to the fact that in modern dairy farming, especially since the development of artificial breeding, "biological processes have become exposed to human error."

That statement came from Dr. Raimunds Zemjanis, head of veterinary obstetrics in the University of Minnesota College of Veterinary Medicine.

The critical time in solving fertility problems is the period during which the cow is at peak production and appears healthiest. He said that herdsmen should watch carefully for signs of infertility during this time and should consult their local veterinarians for pregnancy examinations and eventual treatment of problem animals.

Dr. Zemjanis said that the herdsman's responsibility in preventing infertility losses consists of seeing that healthy cows are bred at the right time. With artificial insemination the human being also has the responsibility of providing proper semen handling and effective insemination methods.

He explained that, to maintain high production, cows should calve every 12 months. Every time a cow comes into heat without being bred means a loss of three weeks or more before production can be resumed. The use of a figure as low as \$1 per day shows that losses from missed heats can easily soar to \$100 or more per animal, he stated.

Dr. Zemjanis reported that failure to observe heat and the return to heat after failure to breed was recorded on 47 percent of infertile dairy cows observed at the University's Veterinary Clinic.

BOVINE LEUKEMIA STUDY UNDER WAY AT U OF M

Researchers in the University of Minnesota College of Veterinary Medicine have been working on a study to determine whether bovine leukemia is on the increase.

Leukemia is essentially a type of cancer causing an abnormal production of immature white blood cells of a cancerous nature. These cells go on to form tumor masses in lymph nodes and lymph tissue.

Conducting the study is a team composed of Doctors Jerry B. Stevens, Vaughn L. Larson, D. K. Sorenson, R. K. Anderson, Victor Perman, J. H. Sautter and B. J. Payne.

They point out that diagnostic problems occur because leukemia symptoms often resemble other common diseases. Also, other disease conditions may occur at the same time.

The University of Minnesota research includes study of the occurrence and the distribution of the disease in Minnesota for a period of years to see if the increase is significant or if it is influenced by improved veterinary diagnostic services and other factors. The research also includes study of the clinical and other manifestations of the disease.

Leukemia most commonly occurs in animals between 3 and 7 years of age, although it may be found in cattle of any age. Most common sign of the disease is a progressive loss of weight and condition, even though an animal has been eating well and appears bright and alert.

Enlargement of the lymph nodes is a common symptom. External lymph nodes commonly involved are found near the base of the ear, at the angle of the jaw, along the side of the neck, just in front of the base of the shoulder, in the flank, and at the rear attachment of the udder. These nodes may range from the size of an orange to the size of a football--or larger. Internal nodes may also be enlarged or may be the only nodes enlarged.

About 25 percent of all cattle with leukemia lose control of their rear limbs and tail. Cattle may go down and be unable to rise again although their front legs may appear normal. First symptoms of this disorder may be "knuckling over" of the rear feet and trouble rising in a stall or stanchion.

This condition gets progressively worse until the animal is unable to rise at all, although it still remains bright and alert and usually eats well. The condition is usually caused by formation of tumor masses in and around the spinal cord that interfere with the proper function of the nerves to the rear legs.

Other symptoms of leukemia in cattle include some form of digestive disorder such as chronic bloat, diarrhea, constipation, lack of appetite, or signs resembling hardware disease. These symptoms usually show up when the disease affects organs of the digestive tract.

Symptoms resembling pneumonia or heart trouble may be seen where the heart and lungs are affected by the disease.

Reproductive organs may be affected by the disease in some animals. As a result a cow may become unable to come into heat or to conceive. Eyes may be greatly bulged out or protruding in a small number of animals because of the formation of tumor masses behind the eyes. Milk production gradually decreases as the disease progresses.

Duration of the disease, from the time it is first noticed until the animal's death, varies greatly. One animal may go down and die within 2 or 3 days, while another may show loss of weight for 3 to 4 months. Generally, the disease has a rather prolonged course which becomes progressively more severe.

Under normal conditions only one animal in a herd will be affected by the disease and other cases will probably not be seen in the herd for several years. A few herds have had three to four cases or more over a 2 to 3 year span.

So far as is known the disease is not infectious and is not transmissible to humans or other animals. No one has yet been able to transmit the disease successfully from one animal to another, and there is no known case where leukemia has been transmitted from cows to a human being either by contact with the animal or by drinking the milk of infected animals.

Animals with leukemia that go to slaughter are not used for human food.

EARLY TREATMENT URGED FOR WARTS AND RINGWORM

Early treatment is urged for cattle infected by warts and ringworm.

The State Live Stock Sanitary Board has decreed that cattle with these conditions are barred from exhibition in Minnesota.

Dr. R. B. Solac, extension veterinarian at the University of Minnesota, pointed out that sanitation is important in preventing the spread of these diseases, because both warts and ringworm are contagious and can spread directly from an infected to a clean animal or indirectly by means of objects contaminated by infected animals.

Time is required for the skin of the animal to return to normal after treatment, Dr. Solac stated in emphasizing early attention to the problem.

Cattle warts are caused by a virus and ringworm by a fungus. Warts may be cured by either vaccination or local treatment.

Cattle of all ages are affected by warts, although they occur more frequently among calves and yearlings. They are found on cows' udders and teats and in both dairy and beef cattle up to two years old on the skin around the eyes, mouth, ears, side of neck and on shoulders.

Warts usually clear up spontaneously, but treatment is sometimes required. Treatment can be accomplished by either vaccination, tying them off with sterile cotton thread or by use of acid, iodine or oil.

Ringworm is common among calves, less frequent in adult animals. The infection spreads in a circular manner and gradually becomes larger. The hair over the infected skin breaks

off, and after two or three months, round, sharply-circumscribed, thick, asbestos-like patches appear around the eyes, ears, muzzle and neck. Ringworm usually responds to treatment with fungicidal drugs, and a combination of iodine and glycerin or tincture of iodine may also be effective.

The county agent suggested consulting a veterinarian for specific advice in treating either warts or ringworm in cattle.

STRICT SANITATION IMPORTANT IN MASTITIS CONTROL

Strict sanitation is the most effective barrier between a cow and the organisms that cause mastitis, according to Dr. Raymond B. Solac.

Sanitation should be the basis for all dairy herd management operations. The only practical way to prevent spread of mastitis is to keep it from reaching udder tissue. Veterinarians have found no practical way to stop infection from occurring once the organism enters the udder.

Dr. Solac says these are the important rules to follow:

* Use the strip cup for early infection detection.

* Milk in this order: heifers, clean cows, mastitis-infected cows.

* Wash the udder--stimulating milk let-down while you do so.

* Disinfect teat cups properly between cows, rinsing cups in cold water before disinfection. It takes more than a swish through disinfectant to do the job--cups should remain in the solution for 2 to 3 minutes. You may need to use an extra set of teat cups.

* Prevent udder and teat injury by providing ample stall space and adequate bedding for your cows.

* Handle your milking machine carefully. Keep rubber inflations and hose clean and in good repair. Follow manufacturers' instructions concerning rate of pulsation and inches of vacuum, and remove each teat cup when the quarter is milked out.

* Don't neglect dry cows. They need good housing and balanced feed.

* Do not allow heifers to suckle from each other's undeveloped udders. And don't feed them milk from infected cows unless it has been pasteurized.

* Check all new cows for signs of mastitis. Do not accept mastitis infected animals.