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Bill Cromell, Station Forester, and Chapman sign with up-dated growth and yield data.

Chapman Plantation 1985 Thinning Yields Poles-Piling

Bill Cromell

The 85-year-old red pine Chapman Plantation located on the University of Minnesota's Experiment Station here at Grand Rapids received another thinning this winter. I am in the process of putting the data together but want to pass some of the general findings on to you at this time.

This 85-year-old plantation continues to provide unique valuable growth and yield information. This planting is named after one of our early well known foresters, the late H.H. Chapman. Chapman went on to become the dean of the Yale School of Forestry. In 1897 when land clearing was the goal in this area, Chapman became Superintendent of this Station. He was in charge only a few years, but long enough to somehow establish one of the first conifer plantations in the state. In 1897 he obtained wild red pine seedlings from Carlton County. They were raised in transplant beds here on the station until 1900. In 1900 the stock was ready for field planting. A recently cutover area existed at the station. A fire was run over the planting site. The soil was rocky but sandy, so it was an ideal red pine site. I would think the main purpose of the fire was to reduce the slash to improve access and reduce the amount of fuel in the event of a wild fire.

The initial planting was made at approximately a 6 ft by 6 ft spacing offering 1200 trees per acre. During the spring of 1905 a wild fire destroyed many of the stems reducing the number to about 600 per acre. The original planting was 32 acres in size.

In 1915 the late Dr. J.H. Allison, then a member of the College of Forestry staff, decided to establish growth and yield plots within the planting. From this early work, three of the original Chapman plots remain. They are approximately one-half acre each. In 1915 each stem in these plots was identified using metal tags. This individual tree method continues to be used today in the planting.

Individual tree measurements are made every five years. After our 1985 measurements a thinning was made. Careful measurements from the cut trees were recorded. The plots were last thinned in 1973, the B plot has been thinned seven times, the other plots four times.

Although the Chapman plantation continues to contain a higher basal area stand density than is generally recommended, it continues to grow at a faster rate than well-stocked unmanaged red

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Nyvall Appointed Superintendent


Dr. Robert Nyvall

Roy Thompson, assistant director of the Agricultural Experiment Station announced the appointment of Dr. Robert Nyvall as Superintendent of the North Central Experiment Station.

In making the appointment, Dr. Thompson stated that Dr. Nyvall will bring a broad prospective to the North Central Experiment Station. Dr. Nyvall is presently at Iowa State University where he is subject matter leader for extension workers in the Department of Plant Pathology, Seed and Weed Sciences. He is a native of Thief River Falls, Minnesota. Dr. Nyvall has a BS degree in forestry management at the University of Minnesota and a PhD in plant pathology at the University of Minnesota with a minor in soils. He worked at a branch station at Washington State University for a short time before going to Iowa State.

Dr. Nyval plans to come to Grand Rapids in June to assume the duties of the Superintendent.

Dr. Nyvall will replace Dr. Joe Rust, who recently resigned as Superintendent. Dr. Rust will remain at North Central in the position of Animal Scientist which he held before becoming superintendent in 1978.

From North Central School of Ag. Reunion Committee

Make your plans now for the 1985 All-Class Aggie Reunion. The last reunion was held in 1982 and 149 people attended. All classes were represented except 1932, 1938, 1954, 1955 and 1957. Such an enjoyable time was had at the reunion, the majority decided to hold another this year. Registration will start at the Experiment Station at 1:30 on Saturday, July 20, 1985. Tours of the station will be from 2 to 4 p.m. The social hour and registration will be from 5:30 to 7:00 at the Holiday Inn in Grand Rapids. Dinner will be at 7:00 with the meeting to follow. Please return the form on page 3 to pre-register. Some Aggie alumni may not receive this announcement, so if you know someone who would like to attend, please pass the word or send us their address. Return the form to Robert Frick, Rt 1, Box 612, Cohasset, MN 55721, before July 10, 1985.

Chapman Plantation 1985

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pine plantations or well-stocked natural stands.

The Chapman yield data clearly indicates that intensive management increases the overall volume, provides larger products of higher quality in a reduced number of years. This is what management is all about, more fiber on a shorter rotation on a given site.

Growth and yield figures for the Chapman Plantation at age 85 (before the 1985 thinning) are given in Table 1. Table 2 relates to the volumes that were cut in each plot in 1985. Table 3 indicates the volume height, DBH, and other information after the thinning. The following tables were utilized for all computations.

1. Cords-Composite Volume Table, Tech Bulletin No. 1104, USDA - Table No. 5
2. Board Feet-Red Pine Mgmt in MN, Circular No. 778, USDA, Table No. 24
3. Current Annual Growth - John Benzie, Mgmt of Red Pine in N.C. States. General Tech Bulletin, NC-33, USDA, Table No. 8.

Research Foundation Funds are Growing

For the past several years the Institute of Agriculture has been very successful in building up an Agriculture Future Fund through donations to the University of Minnesota Foundation. These donations have come from friends and alumni of the University who desire to help support the agricultural research and education programs of the University.

The University depends on several sources of funds for financial support. During the past year support was 37 percent from state appropriated funds, 40 percent from University income sources, 16 percent from federal programs and 7 percent from private gifts. Private gifts have become more and more important as public funds have been cut during the past several years. These gifts were a very significant help to the Unitversity in meeting the needs of Minnesota's agricultural and forest industry.

Gifts or bequests of any size made to the University of Minnesota Foundation are tax deductible. Individuals, businesses or organizations may designate a gift to go to a specific department or experiment station of their choice. Recently we have established a research fund for the North Central Experiment Station. We hope that this fund will grow to provide funds to support our continued research efforts to benefit northeast and north central Minnesota.

For more information about gifts to the Agriculture Fund, write to Agriculture Future Fund, University of Minnesota, 201 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108, or to Superintendent, North Central Experiment Station, 1861 Hwy 169 East, Grand Rapids, MN 55744.

Chapman Plantation 1985

Table 1. Growth and yield data at 85 years (before 1985 thinning)

Three one-half acre plots converted to per acre

	Plot A	Plot B	Plot C	Per acre avg
Original no. trees	1,200	1,200	1,200	1,200
Present no. trees	268	180	138	195
Total ht, ft[1]	87.9	87.5	89.5	88.3
DBH, in	12.5	15.3	16.5	14.8
Avg basal area, sq ft	227	238	229	231
Merch vol, cd units	91.5	98.4	94.4	94.7
Merch vol, bd ft units	44,580	48,400	45,680	46,233
Current annual growth, cds/ac[2]	1.1	1.6	2.7	1.8

[1]Based on 64 trees measured during 1985 thinning
[2]Plots remeasured every 5 years

Table 2. 1985 Chapman plantation thinning summary

1985 Thinning Data Per One-half Acre Plot

Plot	No. Trees	Avg Ht	Avg DBH	Avg B.A.	Avg Cds or	Bd Ft Units
A	31	87.9	10.4	18.555	7.304	3,510
B	20	87.5	13.8	20.992	8.503	4,100
C	13	89.5	14.6	15.197	6.102	2,980
Three Plots Converted to Per Acre						
A	62	87.9	10.4	37.776	14.608	7,020
B	40	87.5	13.8	41.984	17.106	8,200
C	26	89.5	14.6	30.394	12.204	5,960

1985 Thinning on a Per Acre Basis (3 plot avg)

No. Trees Harvested	Ht	DBH	Basal Area	In cords or	Bd Ft Units
43	88.3	12.9	36.718	14.64	7.060

Products Cut from Three One-half Acre Plots were as follows:

62 - Barn Poles (16 to 35 ft)
16 - Utility Poles (35 to 40 ft)
9 - Natural Taper Piling (35 ft)
17 - Standard Piling (25 to 55 ft)
104 pcs total, **plus** 1770 bd ft of Bolts and Logs

Thinnings have been carried out:

Plot A - 1955, 1966, 1973, 1985
Plot B - 1930, 1935, 1948, 1955, 1966, 1973, 1985
Plot C - 1955, 1966, 1973, 1985

Table 3. 1985 Chapman Plantation volume and other date after thinning.

One-half Acre Plots Converted to Per Acre Basis

	Plot A	Plot B	Plot C	Avg 3 Plots
Original No. trees	1,200	1,200	1,200	1,200
Present No. trees	206	140	112	153
Total ht, ft	87.9	87.5	89.5	88.3
DBH, in	13.1	16.0	17.1	15.4
Avg basal area, sq ft	189	196	199	195
Merch Vol, cords	76.9	81.3	82.2	80.1
Merch Vol, bd ft units	37,560	40,240	39,720	39,173

Note: DBHs range of residual stand - 9.1 to 22.0 in. Total hts ranged from 81 to 94 ft

It appears that at the rate the Chapman Plantation is growing that management will continue. Little, if any, mortality has taken place in the plantation even at age. 85.

Using Native Lumber in Structural Framing

James J. Boedicker

Locally sawn lumber is readily available in Minnesota. Depending upon market conditions, use of locally produced lumber can sometimes result in considerable cost savings compared to using lumber shipped in from the southern or western United States. Unfortunately, lumber produced at most small sawmills in Minnesota is not stress graded. However, this "shortcoming" does not necessarily restrict its suitability for most framing applications. The purpose of this article is to briefly explain some of the factors involved in lumber grading and to provide a few pointers on what to look for in selecting pieces of ungraded lumber for some of the more critical framing applications.

Caution. Structural design with lumber is complex and far beyond the scope of this article. For design of unconventional structures, i.e., those involving heavy loads, long or widely spaced beams, homemade roof trusses, especially if large and/or widely spaced, etc., builders are advised to seek professional help, regardless of whether the lumber to be used is stress graded or not. Help is particularly recommended where the consequence of structural failure is severe.

To begin, it should be recognized that wood is a biological material and exhibits wide variability in strength properties. Also, unlike steel or concrete, the structure of wood is not the same in all directions, and strength varies considerably depending on direction to the grain at which stress is applied. Framing members in structures are subjected to various kinds and combinations of forces. Properties important in determining the suitability of lumber pieces for particular framing applications include: strength in bending, tensile or compressive strength parallel with the grain, compressive strength perpendicular to the grain and shear strength parallel to the grain. Strength variability is also important to consider, at least implicitly, in trying to

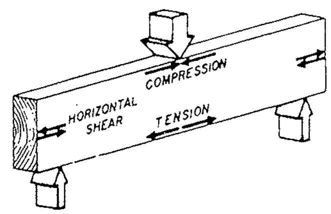

Figure 1. Stress reactions in a loaded beam.

insure that even the weakest pieces will be adequate to withstand the forces placed upon them.

Most stress grading is done visually by trained inspectors. In this process, pieces are sorted in accordance with standard rules into various grades depending on the type and degree of observable defects. These include the type, size and location of knots which reduce strength in tension; checks, splits and shake which reduce strength in shear; decay; wane; sloping grain and other defects.

Different grades within a given specie carry different minimum allowable stress ratings for most strength properties. These ratings are based on results from tests on clear (knot free) samples of that specie. It is not uncommon in these tests to find some pieces that are at least twice as strong in some characteristics as others. From these test results, baseline stress values are established at levels that at least 95 percent of the pieces will withstand without failing. Where necessary, values are adjusted upward to account for the increased strength of wood when dried to or below 19 percent moisture content. Downward adjustments are made to account for extended load duration and to provide a safety factor. Adjusted values for most strength properties are then further adjusted downward by successively greater amounts corresponding to successively lower stress grades. Since graders have no control of how pieces will be stressed, worst case applications and orientations are assumed, and a deficiency in even one strength property in a particular piece is considered sufficient reason to assign a piece to a lower stress grade. The final result is that allowable design stress values assigned to various grades tend to be highly conservative to where the odds that properly "engineered" wood structures will fail are very low. The conservative nature of stress grading and design may well explain why so many long standing but apparently "under-designed" wood structures or members within them are still intact.

In building with non-graded lumber, it is important to have not only an understanding of how defects influence lumber strength, but also some understanding of the types of stresses various structural members must be able to withstand. Bottom chords of trusses, for example are subjected to considerable tension, especially during periods of high snow load, and pieces selected for these members should be as free of large knots as possible. For loaded joists or beams (tension is greatest at the bottom, compression is greatest at the top, and shear is greatest through the center or neutral plane, see Fig. 1), pieces should be free of longitudinal splits and should be oriented so that any large face or spike knots are in the up position.

The following rules of thumb can be useful in selecting and sizing beams. Load carrying capacity of beams is directly proportional to the square of the depth while deflection (sag) is inversely proportional to the cube of the depth. In other words, if depth is doubled, strength is generally increased by a factor of four while, for a given load, sag would be reduced to one eighth.

A check of published stress ratings for lumber of various species and grades shows that minimum allowable stress ratings for our native Minnesota species tend to be from 10 to 30 percent lower than values for corresponding grades of Douglas Fir and Southern Yellow Pine. However, most of this difference can be offset if careful attention is paid in selecting pieces for particular applications and orienting them to take best advantage of the strength properties they do possess. One useful fact to remember is that where other factors including moisture content are equal, most wood strength properties are most closely correlated with density, i.e., the heavier the piece, the stronger it is. Another is that where several framing members act together such as properly bridged floor joists or members of built-up beams, weakness not apparent in one piece will likely be more than offset by higher strength in others, thus reducing the chances of failure of any given piece.

The preceding information was based partially on an article in the Sept/Oct 1983 issue of the *Minnesota Forest Products Marketing Bulletin* entitled "Selecting Native Woods for Strength in Framing" by Harlan Petersen, Extension Forest Products Specialist, University of Minnesota. Copies of this article and other related information are available by writing or calling this station.

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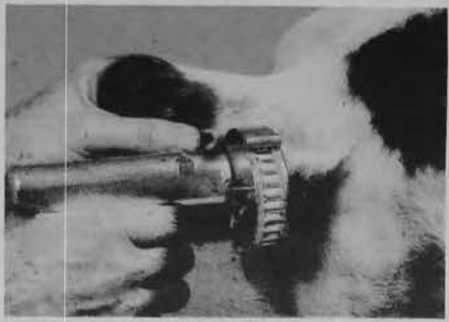
Implants for Beef Calves

Joe W. Rust

Profit margins in the beef cow-calf industry have not been all that good in recent years. There are differences in costs of production and profits among herds and operators. Perhaps some of the differences in profit are due to the recognition and utilization of cost effective management technology.

One of these cost effective management techniques is the use of growth promoting implants with calves. Implanting can be done with little cost or extra effort but will give a return well above the cost. Many of our successful cow-calf producers have recognized the boost in rate of gain from implants and have been implanting their calves for a number of years. The result is more pounds of calf to sell in the fall. There are still a number of producers who have not taken advantage of the practice.

We know that implanting works. There have been hundreds of University trials, including several at North Central, that show increases in rate of gain generally from 4 to 15% when calves are implanted. There are several approved implants commonly used for calves. RALGO implants which contain the compound zeranol is probably the most commonly used for calves. RALGO is not a hormone. It appears to affect the release of certain hormones in the body and is classified as a protein building agent. RALGO is effective in growth promotion for all ages of cattle. Synovex-C, STEER-iod and Compudose are also effective products that promote growth with suckling calves. These latter three products contain forms of esterdiol and/or progesterone hormones which are released in small amounts over a period of time. Care must be taken to place the pelleted implant in the proper location. The proper location for Synovex-C, STEER-oid and Compudose is under the skin in the center one-third of the back of the ear. RALGO should be implanted in the muscle and fat tissue at the base of the ear. The pellet should not be crushed. Crushed implants will release their active ingredients too quickly. To avoid crushing, insert the needle its full length and then withdraw a distance equal to the space to be occupied by the implant. Do not deposit the implant into cartilage or into skin where there is no blood supply for absorption. On the other hand, if a blood vessel is severed absorption will be too rapid. Good sanitation should be observed to avoid infection.



The proper implant site for RALGRO.

Implanting calves can be done anytime after birth. Many prefer to implant in the spring sometime soon after all calves are born and before they go to pasture. Since most implants except Compudose lose their effectiveness after about 100 days a second implant given in mid or late summer will provide and added boost in gain.

Implants will improve rate of gain in heifers, steers and bulls. Implanting bulls to be used for breeding is not recommended. Reduced fertility could result. Likewise heifers to be used for herd replacements should not be implanted more than once and only when under four months of age. Steers kept on the farm or in the feedlot over winter should be implanted again after weaning.

Table 1 shows the results of a recent implant trial at North Central. While results can vary depending on type of cattle, pasture conditions, etc. these are typical of many trials that have been conducted. With good management conditions implanting can result in an extra 20 to 40 pounds of additional weight at weaning. Certainly this is a good return for $1 to $2 and a little extra time invested. Can you afford not to implant?

Table 1. Effect of Ralgro implants (36 mg) on body weight gain of nursing calves

Treatments	No implant	One implant May 1	One implant July 24	Two implants May 1 & July 24
	Lb.			
Initial wt (May 1)	143.6	145.9	140.6	152.6
Wt July 24	300.7	312.9	295.6	326.0
Gain to July 24	157.1	167.0	155.0	173.4
Wt Sept. 24	430.7	445.8	447.8	471.2
Gain to Sept. 24	287.1	299.9	307.2	317.6
Wt Oct. 19	481.2	500.8	500.3	525.8
Gain to Oct. 19	337.6	354.9	359.7	373.2
Difference from Control (gain to Oct. 19)	—	17.3	22.1	35.6

Coming Events

Visitors Day
Thursday, July 18, 1985

North Central School of Agriculture All-Class Reunion, Saturday, July 20, 1985

Horticulture Night
Wednesday, Aug. 28, 1985

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