Lesson 3 Commercial Thinning – Economics

What do we need to know?

60 minutes

Objectives:

1. To pick stands that are economically suited for CT.
2. To introduce some common economic terms and explain what they mean.
3. To make prescription writers aware of the value differences by log size.
4. To review current information on the profitability of CT.

Equipment Needs:

- flip chart
- overhead projector

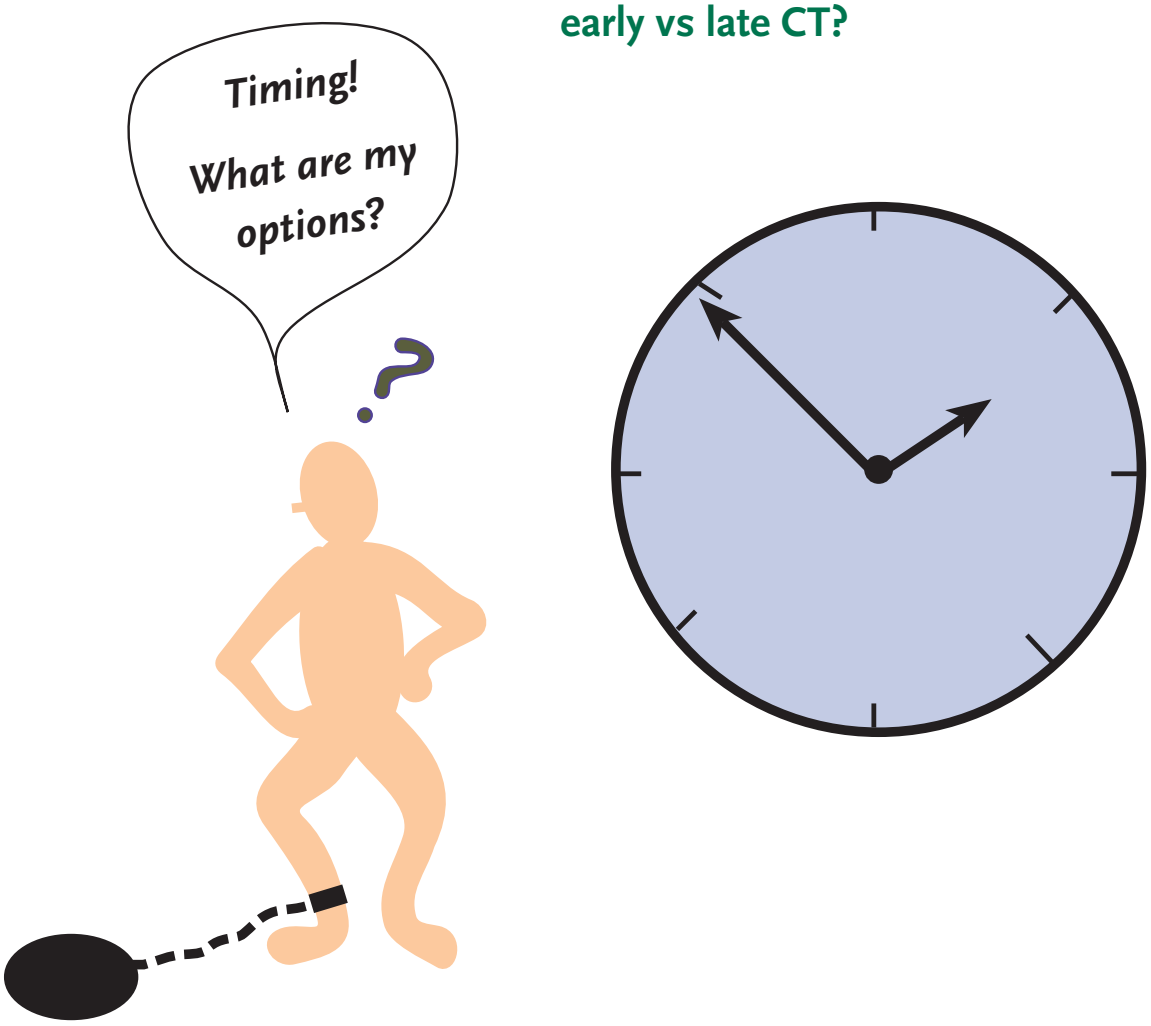
Method:

- lecturette

CT – It should pay

Timing of thinning

- When is best?
- What are the impacts of early vs late CT?



Overhead: Commercial thinning – It should pay

Facilitator: When to commercial thin – what are the options?

In most cases, when the CT is going to be done to obtain volume where adjacency considerations limit harvesting, the timing will be dictated for you – or you will have your hands tied.

When it is being planned and implemented without spatial constraints, there are some economic considerations.

- **If you harvest too early the value of the crop will be lower than if you wait for larger piece sizes.**

Stone's profit and NPV tables show the trade-offs for harvesting early or later. Remember, if you wait until the stand is more merchantable, it will push your rotation age out, especially if the CT was done to a relatively low density.

Thus timing must be based on rotation length, site potential (site index – as better sites respond faster), and markets for the thinned material. As a rule of thumb, CT is viable on a range of sites from age 30 (very good sites) to age 70 and beyond. The time between CT and final harvest will depend upon the CT intensity, but ranges from 10 (very light thinning) to 40 years for heavier thinning.

- **The effect of waiting too long is that it will prolong the final rotation date, and that you may miss some natural mortality.**

Commercial Thinning – Economics Age vs Size

- The age of the stand is not as important as the size of the stems and their merchantability.
- For CT (like all harvesting) the intent is to make money.

CT cuts smaller logs making timber grades especially important.

Overhead: **Commercial Thinning – Economics – Age vs size**

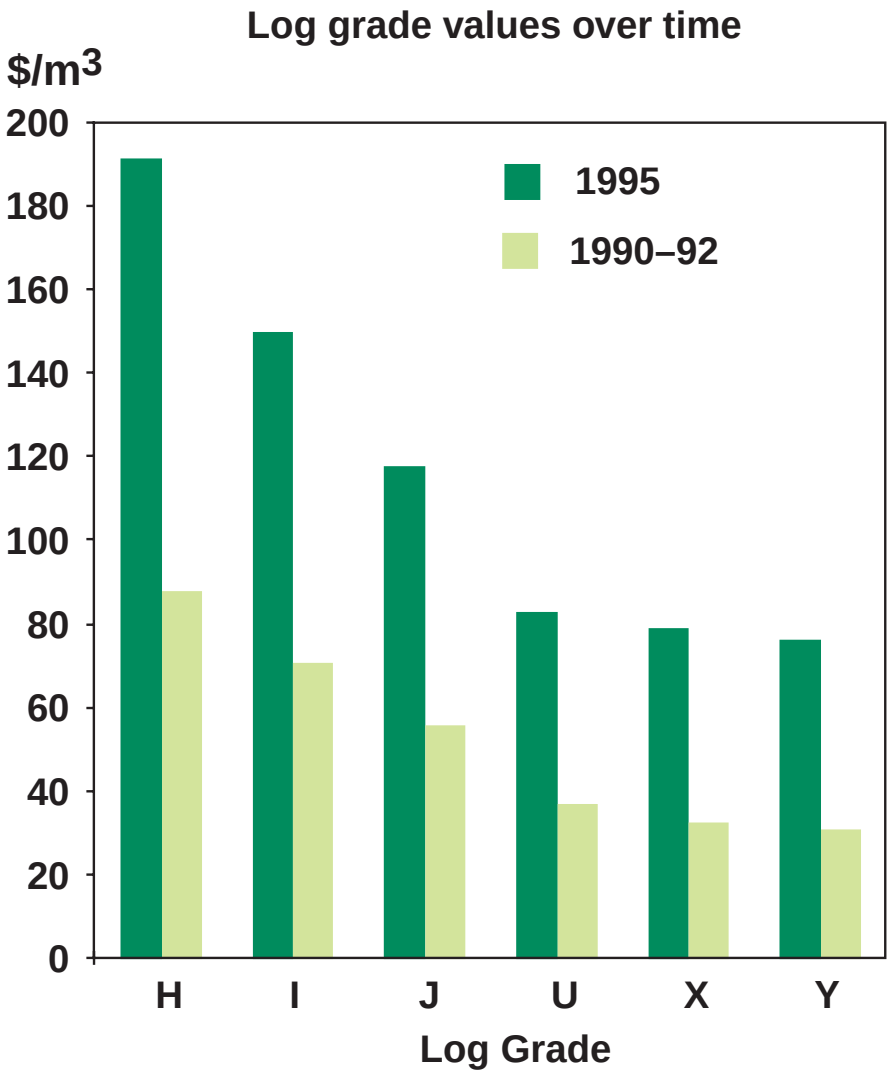
Facilitator: When to commercial thin – what are the options?

This is an introductory overhead that introduces the issue of economics.

The section will contain an overview of value by log grade or piece size, NPV vs SV, generalizations from NPV runs, a look at the review of the economics of CT in BC.

Commercial Thinning – Size and Value

1990–92 and 1995 Average Log Prices by Grade



Overhead: **Commercial Thinning – Economics – Size and Value**

Facilitator: Use this overhead to show the value of larger piece sizes.

Stress the following:

Commercial thinning will not likely add much volume to the stand but can create conditions where additional growth of leave trees makes them more valuable.

Log grades are based on log length, top diameter, size of knots, number of rings per rad (2 cm section), amount of merchantable wood per log and species. Information on log grades can be obtained from the MoF Revenue Branch *Scaling Manual*.

The values by log grade (1990–1992) are from Stone (1993), page 80. They are in 1992 dollars. The 1995 data are from *Forestry Industry Trader.* Monthly figures from the Vancouver log market and are in 1995 dollars. There are two obvious trends.

1. As you move from H through to Y grade logs the value decreases significantly.

2. The trend is similar for both reporting periods.

Ask: What factors are used in grading logs?

CT – Size and Value

Log Grading Rules – Coastal BC

Grade	Minimum length	Minimum top diameter	Maximum knot size
D	5.0	76	n/a
F	5.0	60	n/a
H	5.0	38	5
I	3.8	38	8
J	5.0	16	4
U	5.0	10	4
X	3.0	10	4
Y	n/a	10	n/a

- Think of the log grades your stand will produce over time.
- Use growth models to help you estimate log size.
- Log length, top diameter and knot size influence grade.

Overhead: Commercial thinning – Log grading rules

Facilitator: Walk the group through the listed log grades pointing out the important variables (i.e., minimum top diameter inside bark [dib], knot size and length of log).

Log grades for coastal B.C. logs are defined in the Ministry of Forests (Revenue Branch) *Scaling Manual*. Value (1995) *Forest Industry Trader – Vancouver Log Market Monthly* averages, and 1990–1992 from Stone (1993).

D grade sawlog – minimum top dib is 76 cm; minimum 90% of the surface is clear; minimum length is 5 m; minimum of 3 rings/cm in the outer third of the log; minimum of 75% merchantable; 50% clear. This is an 'old-growth' grade.

1995 average price = $617.41/m^3

F grade sawlog – minimum top dib is 60 cm; maximum knot size 4 cm; minimum 75% of the surface is clear; minimum length is 5 m; minimum of 3 rings/cm in the outer third of the log; minimum of 75% merchantable; 25% clear.

1995 average price = $381.15/m^3

H grade sawlog – minimum top dib = 38 cm, maximum knot size is 4–8 cm; minimum length of the log is 5 m; minimum of 2.5 rings/cm in the outer third of the log; 50–75% lumber, 65% merchantable.

1995 average price = $191.34/m^3 (1992 – $87.28)

I grade – minimum top dib 38 cm; maximum knot size 8–10 cm; minimum length is 3.8 m; 50–75% lumber, 65% merchantable.

1995 average price = $149.39/m^3 (1992 – $70.55)

J grade (gang) – minimum top dib 16 cm; maximum knot size 6 cm; minimum length is 5 m; 75% lumber, 50% merchantable.

1995 average price = $117.30/m^3 (1992 – $55.65)

U grade – minimum top dib = 10 cm; minimum length; maximum knot size 4–14 cm; 50–75% lumber, 35% merchantable.

1995 average price = $82.32/m^3 (1992 – $36.42)

X grade – utility grade – minimum top dib = 10 cm; minimum length; maximum knot size 4–14 cm; 33.3%+ lumber, 35% merchantable.

1995 average selling price = $78.69/m3

Y grade – Chipper grade – < utility > firmwood reject

1995 average selling price = $75.82/m^3

Commercial Thinning – Economics

NPV vs SV?

What are we talking about?

- bringing costs and revenues to one point in time
- using a discount rate to account for time

$$SV = \frac{\sum_{i=0}^{A} R_i (1+r)^{A-i} - \sum_{i=0}^{A} C_i (1+r)^{A-i}}{(1+r)^{A} - 1}$$

R_i = revenue at age i

C_i = cost incurred at age i

r = the discount rate

A = the rotation age

Overhead: Commercial Thinning – NPV vs SV

Facilitator: SV vs NPV.

SV – is also known as soil rent, bare land value, and soil expectation value. SV works the same as net present value (NPV), except it starts the block from bare ground and includes all costs from there on. That includes regeneration, spacing, etc. The NPV calculations deal only with current and future costs; old costs are considered sunk. For a good overview and lots more equations see Stone (1993), page 22–23.

Note: NPV can only be estimated, as we do not know the future timber values or harvesting costs.

First of all what is NPV and why do we do we use it?

Facilitator must become familiar with this information.

- NPV is the net present value. It is used to compare value over time using the notion of interest adding to value over time. The concept is that if we sold something today we could invest the money and that sum would be greater in the future due to compound interest. The interest rate chosen by Stone (1993, 1995) is 4%. This is often called the social discount rate, or the rate at which society deems an investment worthwhile. This 4% is after inflation.
- Do we have to go through the calculations for each block we treat?
- No. Stone (1993, 1995) provides example tables for numerous scenarios that should be used when you have a similar site. If you are planning a significant CT operation it may be worthwhile to work through a more specific analysis. The Forest Practices Branch is preparing a two-day workshop that would help in your financial assessment. We will only touch on the inputs here.
- The formulas seen on this overhead are found in Stone (1993), pages 21–23. If you have information to fill in the cost and projected revenue figures, you can use the formulas found there to determine NPV for your regime.

Commercial Thinning – Economics

Some generalities from NPV runs:

Fdc

- **SI 36 – thinning to 200–400 is economically better than unthinned for all densities tested**
- **SI 30:**
  - **200–300 leave best at mid-thinning age for no PCT**
  - **200 sph leave was best for the late thinning age with no PCT**
  - **with PCT, all thining densities had higher NPV vs unthinned**
- **SI 24 – marginal effects**

Overhead: **Some generalities from NPV runs for Fdc**

Facilitator: Go over the generalities; more detail is found on page 128 in Stone (1993). The marginal effects found with SI 24 indicates the initial cut opens up the stand and leaves it unproductive for too long to make the two pass system economic. Open space is not putting on volume and the remaining trees are not putting on enough to add enough to their value to make it worthwhile.

NPV calculations favor taking lots and leaving fewer to get big quick. Where it isn't productive, this doesn't happen.

Key Points:

The why behind the higher NPVs:

- thinnings concentrate growth on fewer, bigger trees, which create higher value wood
- thinnings produce interim revenues – liquidation of lousy stocks
- sell low/buy high – or did I get that wrong? Cut the poorer part of the portfolio to add room for the better stock to grow.

Commercial Thinning – Economics

Some generalities from NPV runs:

Pli

- **NPV is generally higher for non-thinned simulations**
- **Rotation age is the key**
  - **with longer rotations (past the economic max), lighter thinnings give the best results when harvests are planned in less than 90–100 years**
  - **heavier thinnings give higher returns when harvests are planned for more than 100 years**
  - **for guidance, see table 6.1, page 101 in Stone (1996)**

Overhead: **Some generalities from NPV runs**

Facilitator: Go over the generalities – more detail is found on page 81 and continued on 102 in Stone (1996).

Ask: Why do you think the lighter thinnings give better results with shorter rotation lengths?

Light thinnings are better than heavy with shorter end rotation lengths because there is more time for trees to grow and put on value the longer you wait. You will get fewer, bigger trees that are worth more. With the shorter rotation length and the relatively slow growth, there is not enough additional growth per tree.

Key Points:

The why behind the higher NPVs:

- thinnings concentrate growth on fewer, bigger trees, which create higher value wood
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For a discussion on how Stone presents his results:

There are two overheads, one of SI 22 and one of SI 16, both to 100 years with increments of 10 beginning at 50.

Use the overheads to go over how they work.

Site Index 22

Harvest Age	2,500	5,000	10,000	PCT 1,600	PCT 1,200	PCT 800
50	CC	CC	CC	CC	CC	CC
60	CC	40–900	40–900	CC	CC	CC
70	CC	40–900	40–900	CC	CC	CC
80	50–600	40–900	40–900	50–600	50–600	50–600
90	50–600	40–900	40–900	50–600	50–600	50–600
100	50–600	50–600	50–600	50–600	50–600	50–600

Site Index 16

Harvest Age	2,500	5,000	10,000	PCT 1,600	PCT 1,200	PCT 800
50	CC	CC	CC	CC	CC	n.a.
60	CC	CC	CC	CC	CC	n.a.
70	CC	60–900	60–900	CC	CC	n.a.
80	CC	60–900	60–900	CC	CC	n.a.
90	60–600	60–600	60–900	70–600	CC	n.a.
100	60–600	60–600	60–900	70–600	70–600	n.a.

For the facilitator guide

Economics exercise: ***Small groups. Each group is to come up with three important considerations for a profitable commercial thinning operation.***
They will be guided to read section 7.0 of the Simons Reid Collins Report.

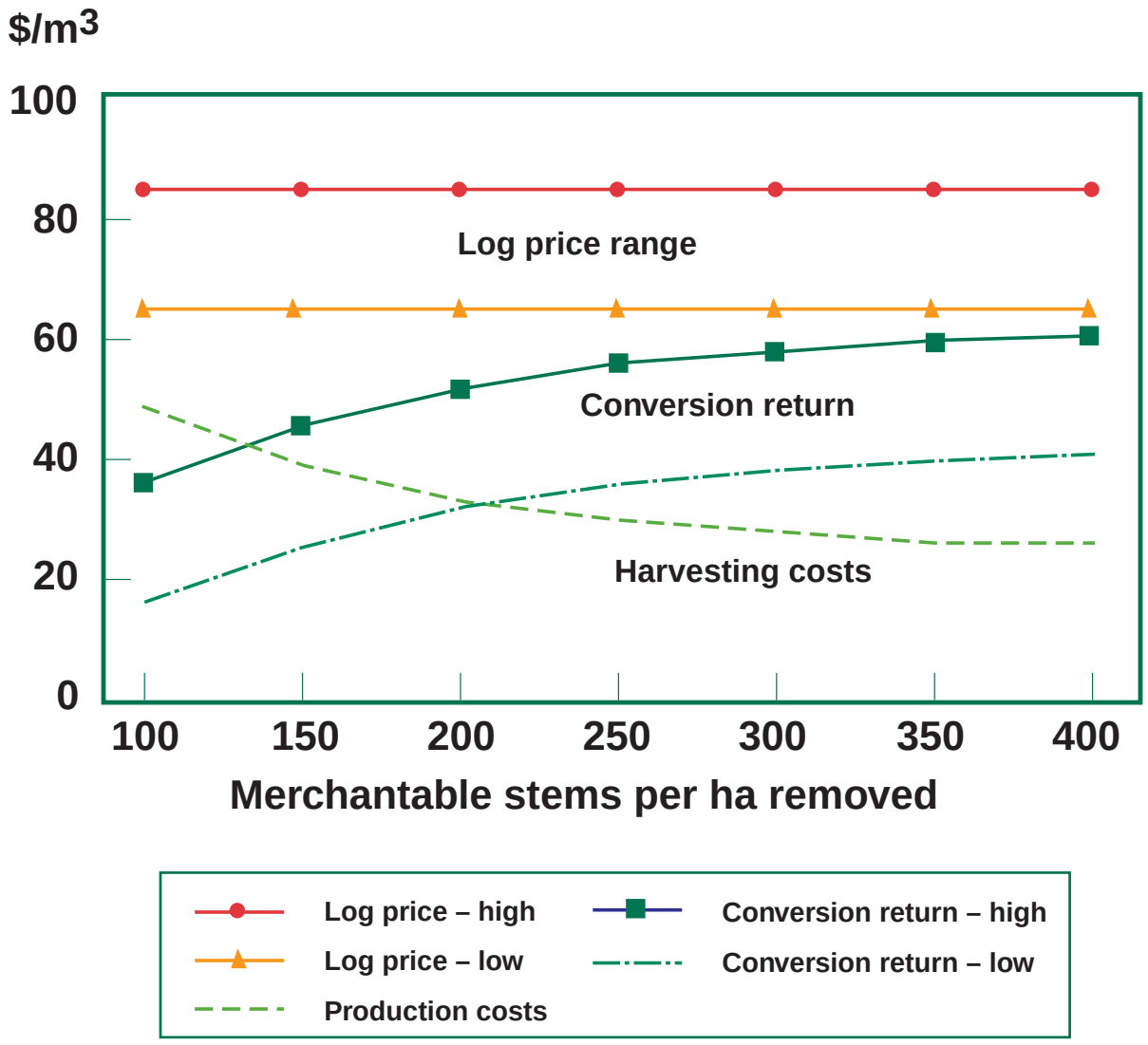
Time: 15 minutes to research; 20 minute discussion

Some expected answers:

- markets must be relatively high to get a positive return for smaller logs.
- the number and size of the logs removed is important. Depending upon the value, the minimum number may be in the order of 200+ stems/ha.
- the operating costs need to be kept low by using appropriate equipment
- the more stems you remove the better the profit margin looks
- the stand must be old enough to have merchantable stems
- lower site index sites will be older than better sites to provide the same volume
- thinnings may need to come from a range of diameter classes not just from below, to provide an economic return
- piece size is important: as the average piece size drops, more stems are needed to break even.

Fir – Gang Sort

Log prices, production costs and converison return



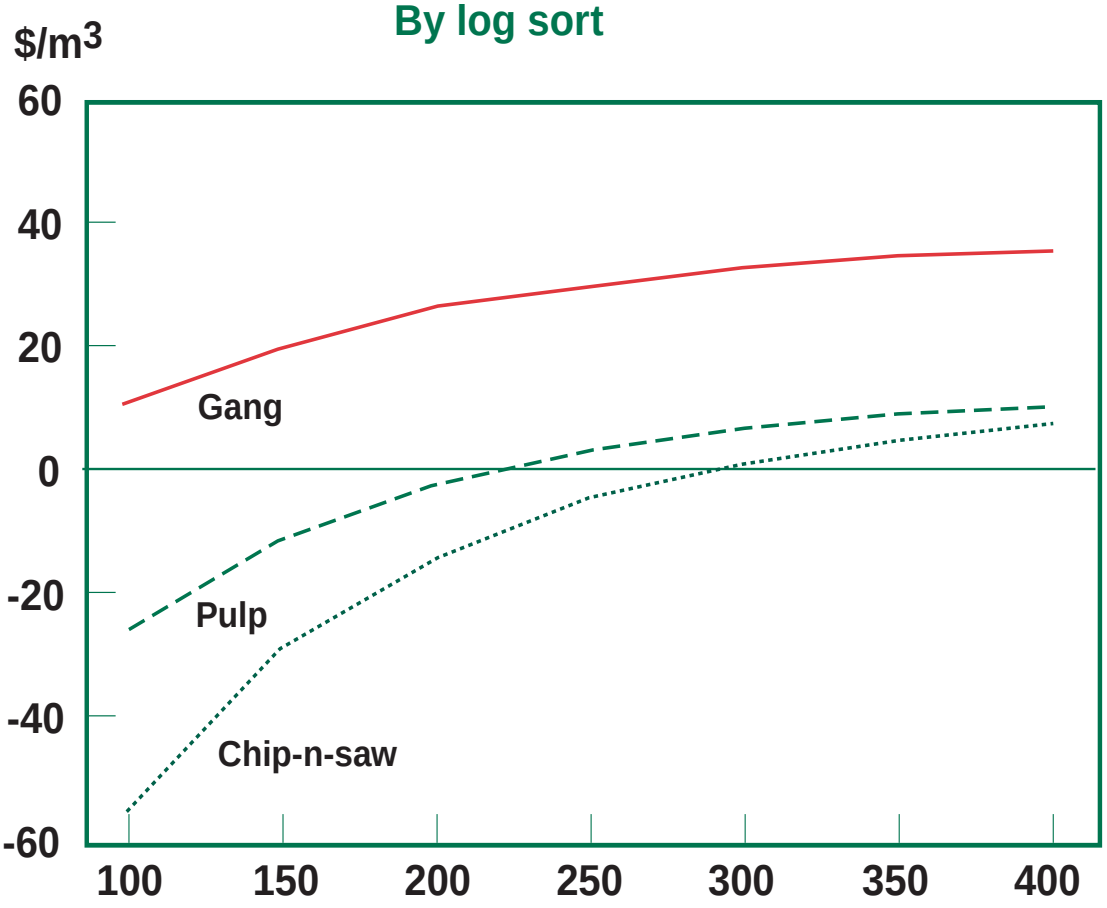
For the workbook include:

Economics exercise: ***Small groups. Come up with three or more important considerations for a profitable commercial thinning operation.***
See section 7.0 of the Simons Reid Collins Report in the back of your binder.

Time: 15 minutes to research; 20 minute discussion

Use overheads 3•10 and 3•11 as backup material.

Average Species Conversion Return



Gang is mostly large J with minor amounts of H, I and U.

Chip-n-saw is mainly U with minor amouns of small J and X.

Pulp is primarily U and X with minor amounts of Y.

Small J is a chip-n-saw log with top 20 cm dib or smaller.

Large J is a gang log 20–36 cm top dib.