

Making it Relevant - genetic improvement of softwoods

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GROWING



MILLING



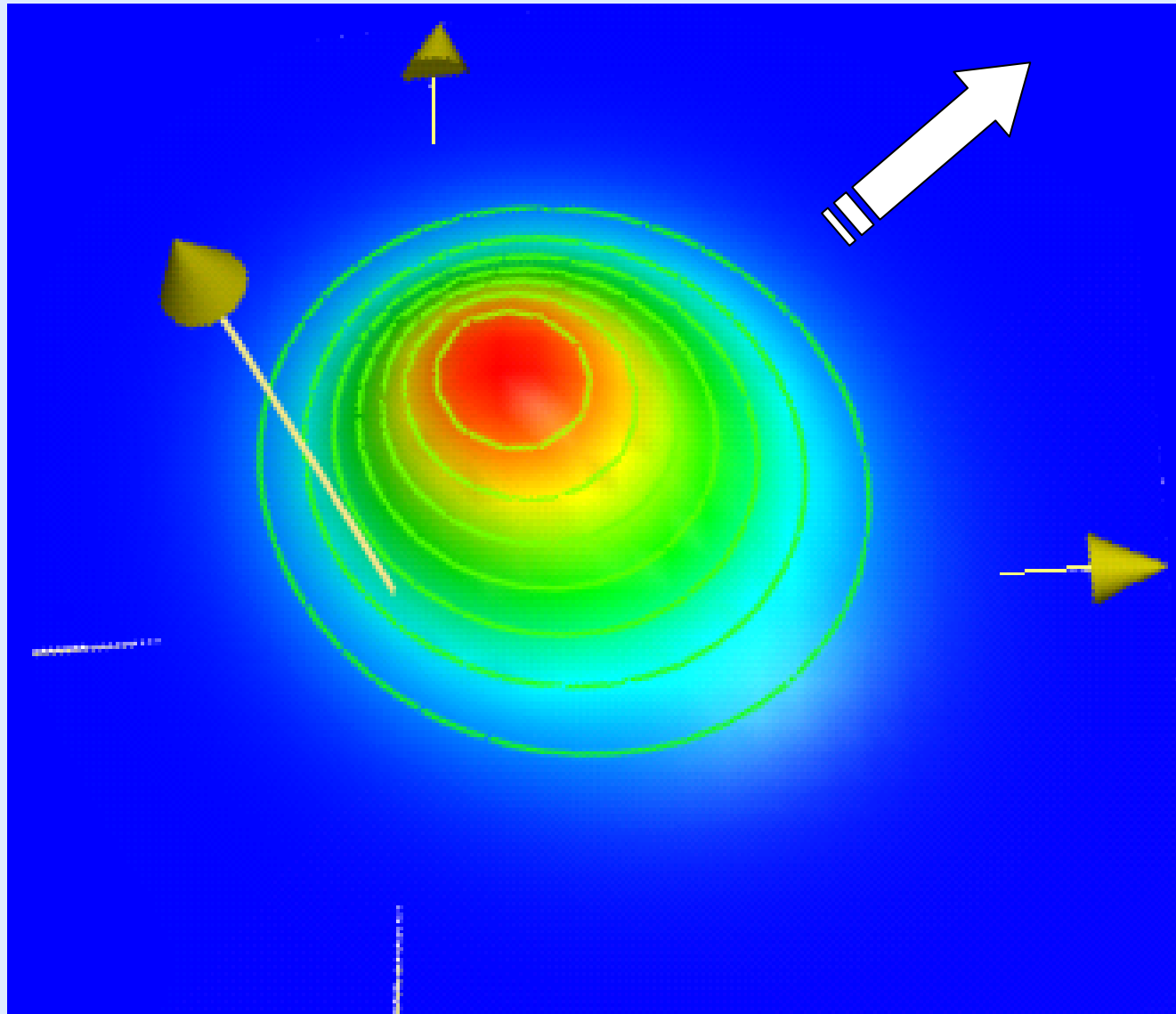
BREEDING



Australian Forest
Genetics Conf.
Hobart, Tasmania
11-14 April 2007

 HORIZON2

Visualising Adverse Inter-Trait Correlations



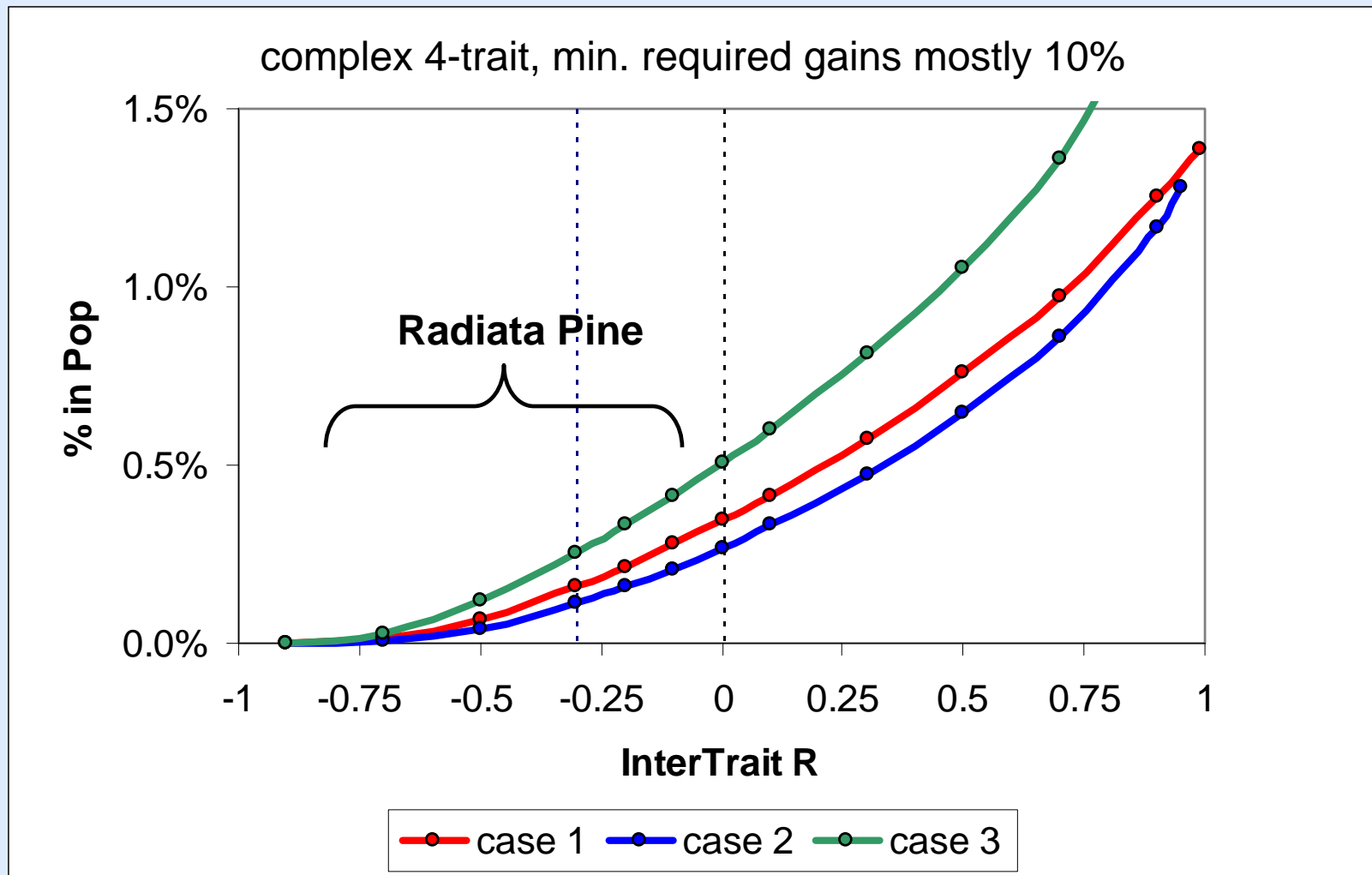
$$r = -0.3$$

Compressed
& slanted
distribution

 HORIZON 2

Adverse Inter-Trait Correlations

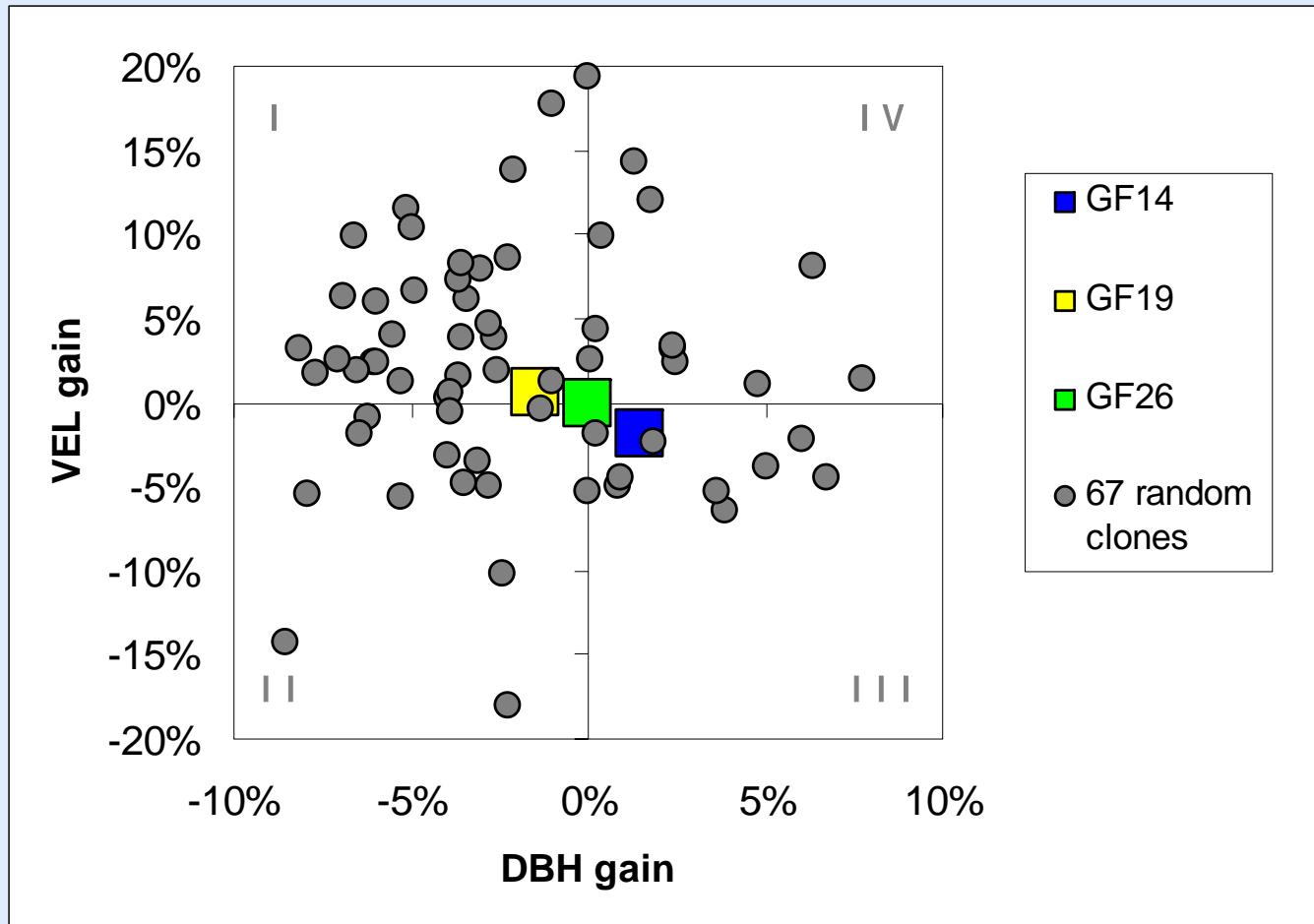
important challenge to Radiata for DBH: Density



How Break Inter-Trait Correlations?

one way is to select & deploy individuals (VF)

3.5 km/s
ST300

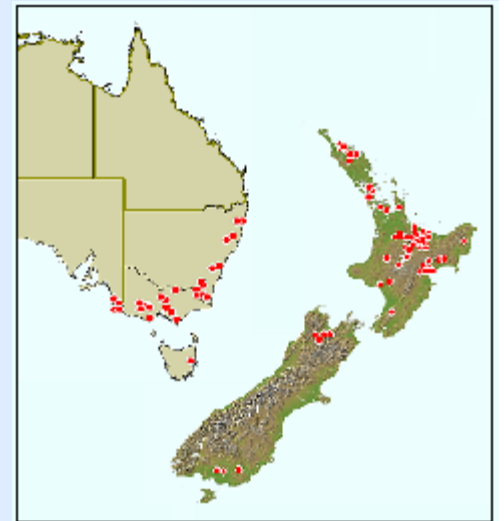


age
12½ yrs

290 mm
DBH

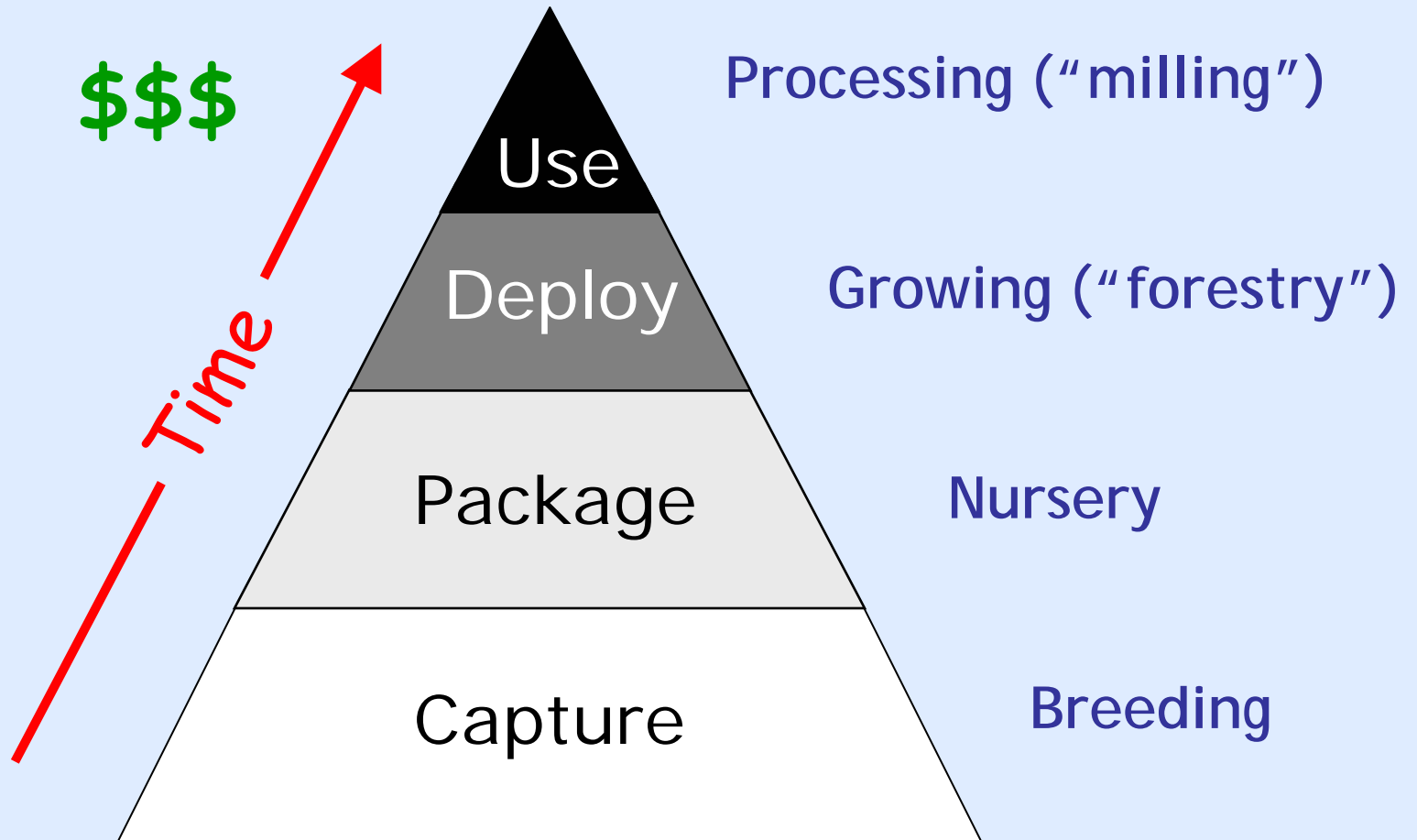
Horizon2's Vision of Future → SE Varietal Pines

- 20-year history in clonal forestry, 40 yrs in nurseries
- Major nursery holdings delivering 30 M plants annually
- Heavy R&D emphasis SE plant delivery systems
- Huge older OG clonal resources
- 3,500 SE genotypes in 45 trials in 3 countries (10% to age 8)
- Current portfolio 40 commercial SE genotypes
half are strongly improved in growth and MOE
- Performance (10 traits) marketed using 0-30+ scale for seed orchard parents



Delivering Gains to Wood Users (People)

ultimate objective of "breeding" (broad sense)



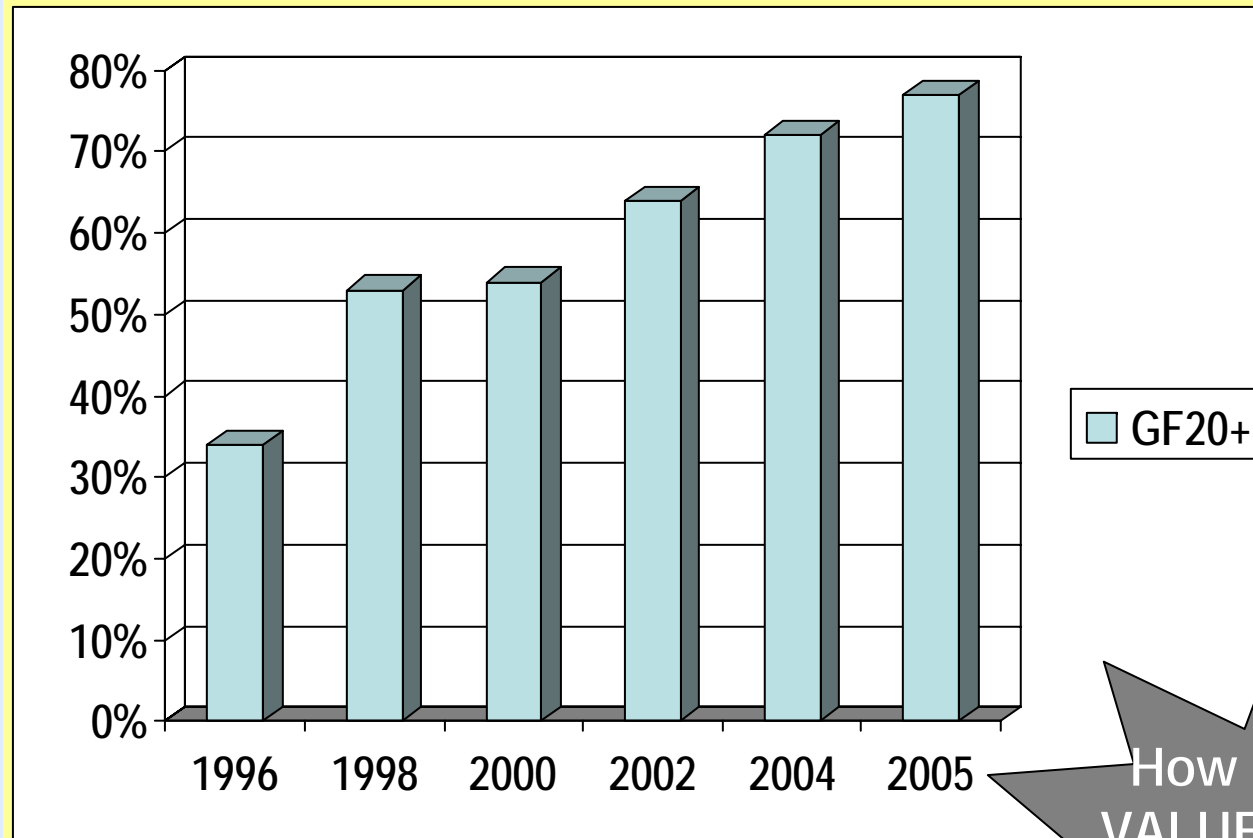
Defining Relevancy of “Breeding” sensitive to time and risk

$$R = \text{Rate of Uptake to Forest} \times \text{Rate of Significant Value Capture}$$

Plus:

- sustainability & genetic diversity
- future product market flexibility
- ability to promote stability in the forest industry

NZ MAF Statistics suggest good UPTAKE deployment of GF20+ doubled over past decade



GF20+
means
control-
pollinated
(CP)

How good was
VALUE capture?
Wood quality?

A Fundamental Dilemma(?)

particularly evident in NZ's North Island

Cut Cost?
or
Raise Productivity?

Noone disputes that
genetics offers the
PROMISE of greater
productivity...

Conservative silviculture boosts log quality but at the *expense* of productivity

Rotation age is *negatively* correlated
to the
relevancy of “breeding”

Breeders need to
CHALLENGE the
effectiveness of
conservative
silviculture with elite
genetics

Customer Attitudes to Risk showing up in forest valuations

“A risk-avoiding person does not choose the same plan as a risk-seeking or a risk-neutral person”

Pukkala and Kangas (1996) For. Sci. 42:198-205

**Risk-avoiding persons
will re-consider given
“facts” but may
otherwise treat
concepts as whimsical**

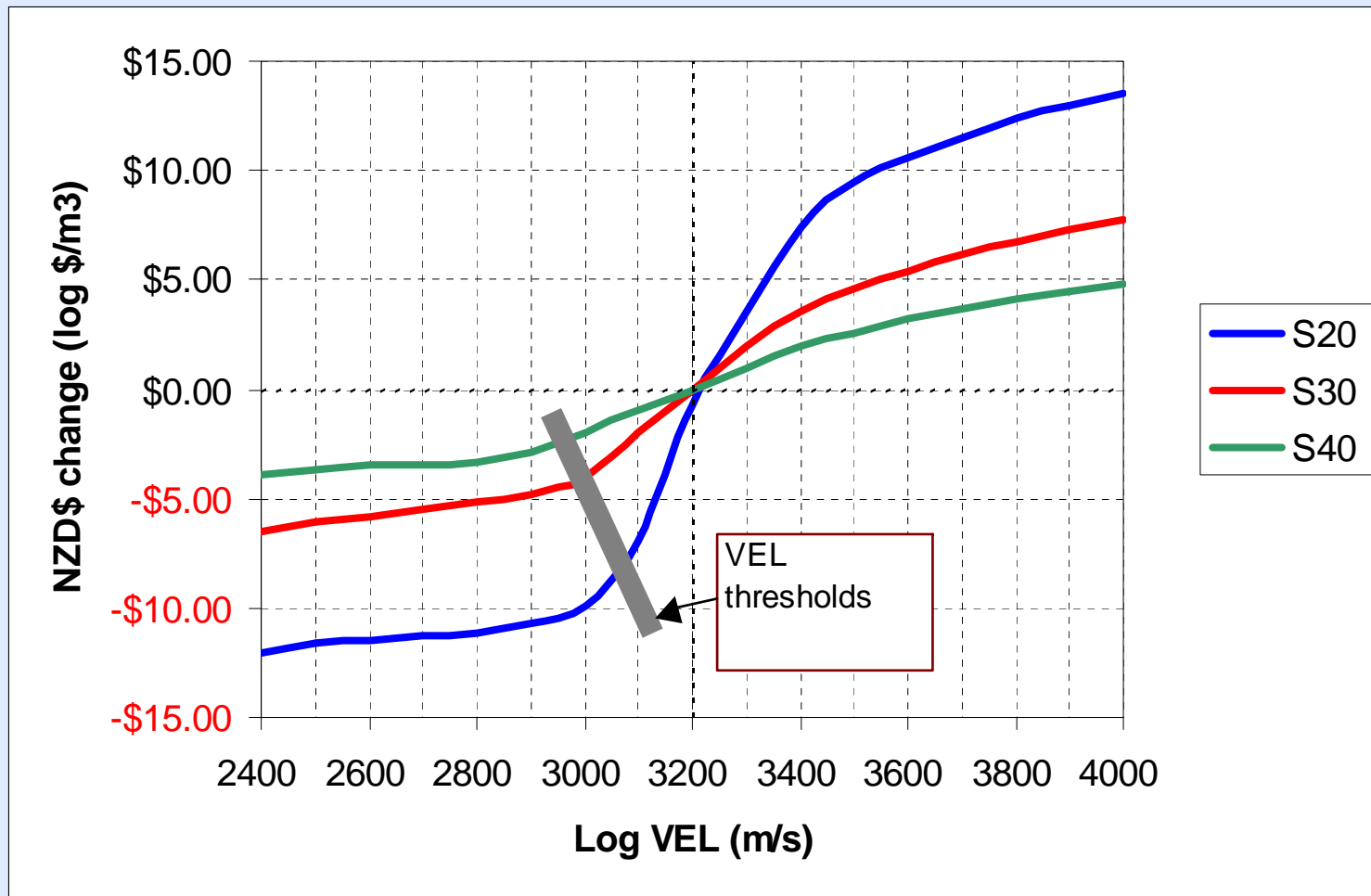
Valuation & Demonstration

two key challenges to enhance relevancy of breeding

Valuation (& related DSS tools)	show that added cost of genetics increases profitability (risk adjusted)
Demonstration	show genetics reliably delivers significant, even transformational, value

Log Velocity Strongly Impacts S-log Value in Mills

Not yet incorporated into log grades



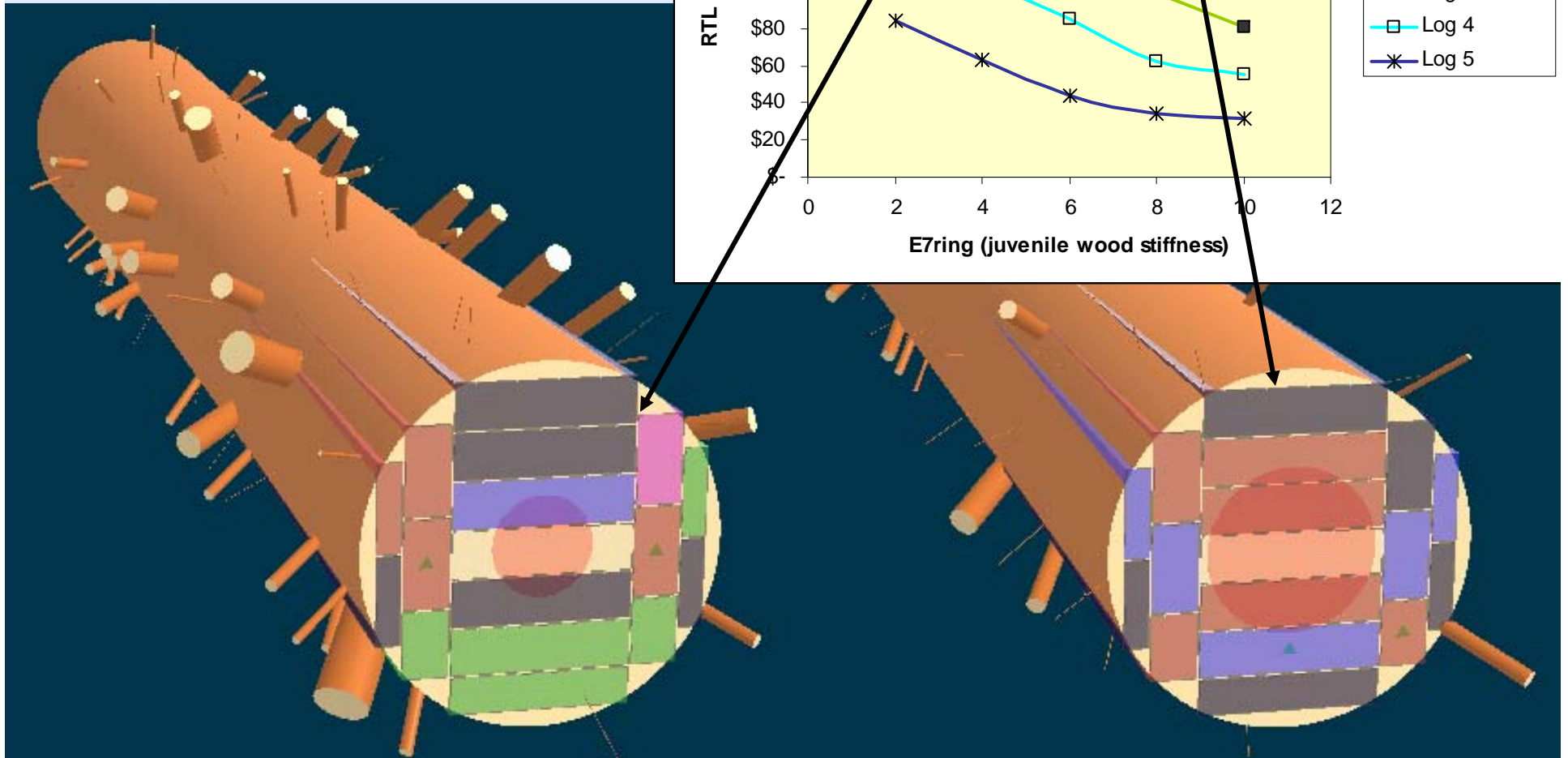
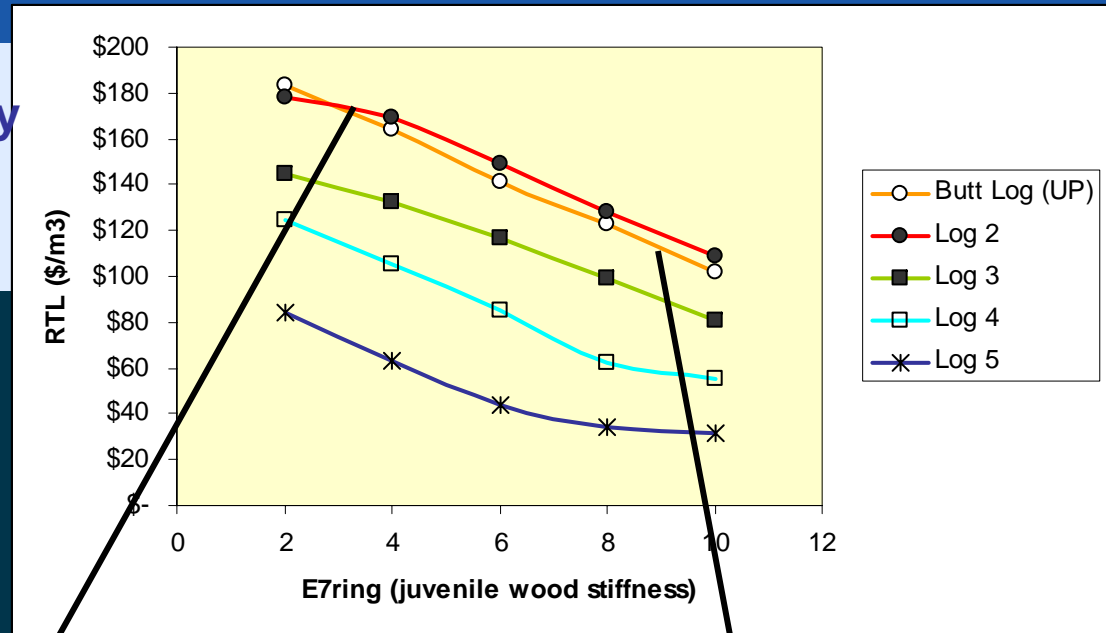
Other Inadequacies of Genetic Valuation DSS barrier to policy development for improved genetics

- growth modeling of unusual growth and/or taper
- models often lack breeder variables
- MRI typically begin at age 10 post-thinning
- log grades are “crude baskets” - poor linkage to conversion and final product outturn

Example Using Silvis

focus on lumber grade, not log grade

Same size, branching, and density
Impact of improved stiffness

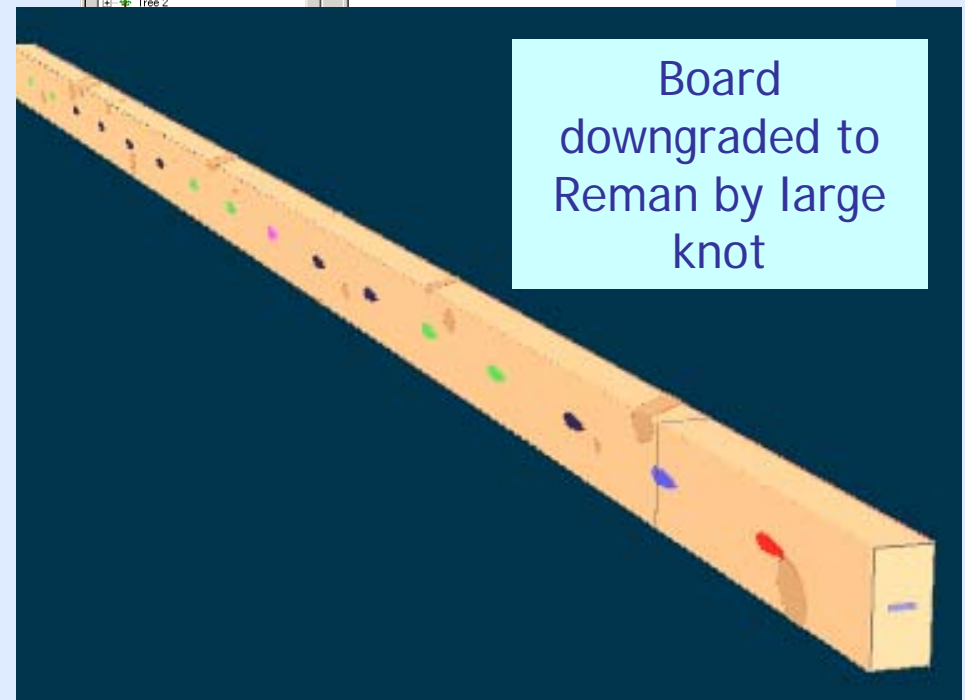
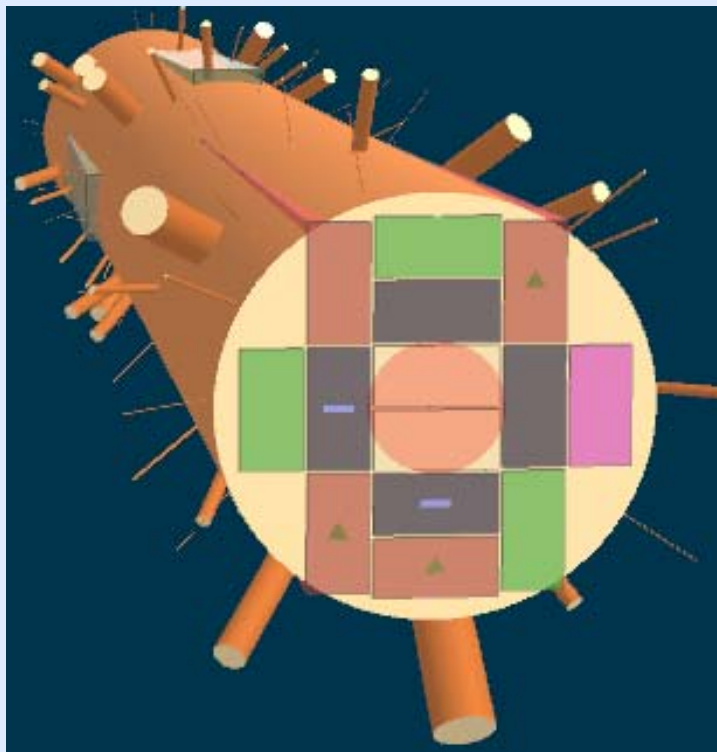


SILVIS v2.07

good agreement generally with Ivkovich *et al.* 2006

Ability to grade MSG boards avoided the crudeness of log-grades and their pricing steps

Tree	DBH(cm)	HT(m)	E7ring	BIX(cm)	RTT(\$/tree)
1	44.5	38.4	2.0	5.0	315.86
2	44.5	38.4	3.0	5.0	306.04
3	44.5	38.4	4.0	5.0	284.85
4	44.5	38.4	5.0	5.0	267.38
5	44.5	38.4	6.0	5.0	210.73
6	44.5	38.4	7.0	5.0	197.28
7	44.5	38.4	8.0	5.0	170.49
8	44.5	38.4	9.0	5.0	170.60
9	44.5	38.4	10.0	5.0	151.16





NZ foresters initially resisted *each new offering* from genetics (OP, CP, cuttings, clones)

DEMONSTRATION FORESTS MAY PRECEDE UPTAKE

Commercial Foresters visiting “Fatso” in the Genetic Gains Test in Kaingaroa Cpt. 1210 (1968)



Horizon2 Clonal Forest Demos

key aspect of our customer education program

Clone 5-123
Age 8 (below) and 10 (right)



Wood stiffness (VEL)
proved 50% more
uniform within clone



FOREST+

An International Programme of Best Practices Forest Demos

- R&D centre designed & managed, including central database and result dispersion
- SO seedlot, OP, CP, VF in block plots for growth & uniformity modeling
- Elite genetics to ensure forest excellence to owners
- Dispersed site coverage (GxE) international
- (cont.)

FOREST+

(cont.)

- Aggressive vs. conservative regimes
- Scheduled valuations (MRI, stumpage, conversion)
- Remote sensing, spatial analysis, GIS
- Industry and government partners
- Marketed on cost sharing, scale, knowledge, genetics
- Timely (deforestation, climate change)

IS THE IDEA VIABLE? WHO WOULD LEAD?

We can improve relevancy of breeding breeders significantly improve crops – that is not disputed

- The promise of genetics, greater 'quality yield', some argue also is also promised by conservative silviculture
- Superior genetics is particularly pertinent in forestry under threat from higher land rentals and energy costs
- Ability to limit rotation length has been central to the concept of successful plantations
- Superior genetic products exist - it is time to impress on investors and policy makers what they can do

ACTION: start an international "Forest+"
programme of "best practices" forest
demos