

Pain Management – Future pain relief options

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Animal Experimentation

The Principles of Humane Experimental Technique

W.M.S. Russell and R.L. Burch, 1959



- **Replacement** - use of non-animal experimental models
- **Reduction** - use of fewer animals, or more information from the same number of animals
- **Refinement** - alleviate or minimize potential pain, suffering or distress, and enhance animal welfare for the animals still used.



Painful husbandry procedures

Similar concept has emerged

- **Replace practice**
- **Refine practice**
- **Relieve pain**

**e.g. Sheep Industry Animal Welfare Strategy April
2012**



Painful husbandry procedures

Current or possible strategies

	Mulesing
Replace	Genetics
Refine	Age Portion of flock: eg animals with wrinkle & dag scores > 2 & breech cover score > 3 Alternatives <ul style="list-style-type: none">• SkinTraction• Clips• Others
Relieve	Tri-Solfen NSAIDs Drug combinations

Painful husbandry procedures

Current or possible strategies

	Mulesing	Castration
Replace	Genetics	Don't castrate prime lambs
Refine	Age Portion of flock: eg animals with wrinkle & dag scores > 2 & breech cover score > 3 Alternatives <ul style="list-style-type: none"> • SkinTraction • Clips • Others 	Age Method <ul style="list-style-type: none"> • Ring • Knife • Vaccine
Relieve	Tri-Solfen NSAIDs Drug combinations	Analgesics Drug delivery methods

Painful husbandry procedures

Current or possible strategies

	Mulesing	Castration	Tail docking
Replace	Genetics	Don't castrate prime lambs	Genetics – short tail Don't dock prime lambs
Refine	Age Portion of flock: eg animals with wrinkle & dag scores > 2 & breech cover score > 3 Alternatives <ul style="list-style-type: none"> • SkinTraction • Clips • Others 	Age Method <ul style="list-style-type: none"> • Ring • Knife • Vaccine 	Age Length Method <ul style="list-style-type: none"> • Ring • Hot knife • Cold Knife
Relieve	Tri-Solfen NSAIDs Drug combinations	Analgesics Drug delivery methods	Analgesics Drug delivery methods

... in recent years

Review literature and current practices

Regulatory and advisory

Research

Replace Welfare Code with new Regulations and Guidelines

Update Best Practice Guidelines

Replace

Refine

Relieve

Principles of Pain Management

Two phases of the response to painful husbandry procedures

- Acute phase
 - Up to a couple of hours
 - Associated with cutting, stretching, tissue anoxia
- Chronic phase
 - Lasts hours to days
 - Associated with inflammation and repair of damaged tissues



Principles of Pain Management

Combinations of analgesics are usually more effective than single drugs

- Combine short and long acting drugs within the one class
 - (eg Tri-Solfen : lignocaine + bupivacaine)
- Combine drugs from two or more classes with different modes of action
 - Tri-Solfen + xylazine (University of Sydney)
 - Local anaesthetics + NSAIDs (large literature on this)

Some drugs (eg NSAIDs) can take 30 minutes or more to exert analgesic effects

- Logistics of drug administration

How do we assess efficacy of pain relief?

Clinical examination

- Heart rate, temp, respiratory rate, demeanor, etc

Clinical pathology

- Haematology, cortisol, acute phase proteins, metabolites, etc

Wound status

- Wound score , sensitivity to stimulation

Behaviours

- Pain related behaviours, ethogram, feed intake, mothering up

Production

- Growth rate, wool production, wool quality

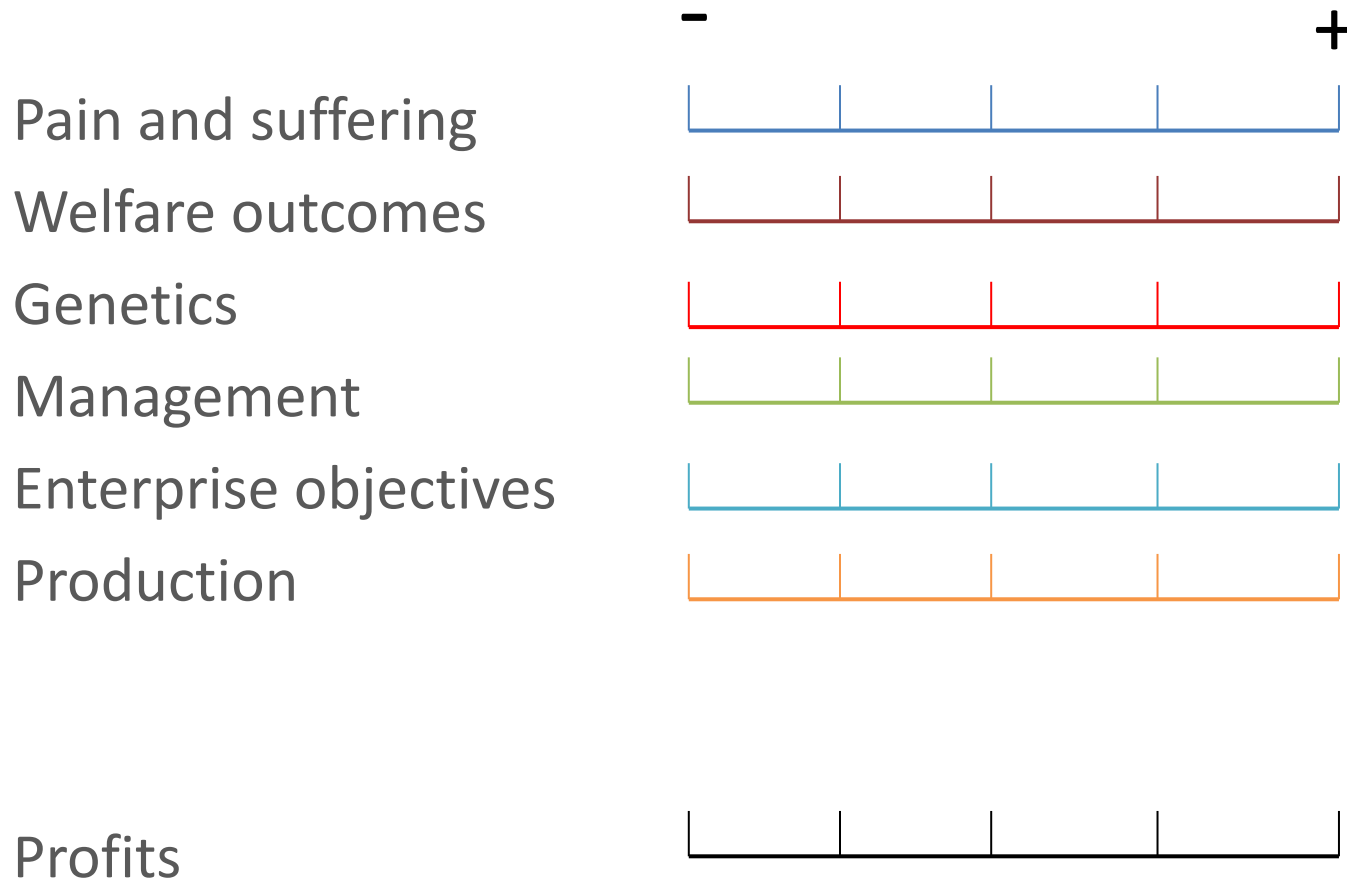
How do we interpret information on painful husbandry procedures, alternatives and relief?

Typical criteria for appraisal:

- Pain and suffering
- Whole of life welfare outcomes
- Genetic objectives
- Management and labour inputs
- Enterprise objectives
- Production and Product Quality
- Profits

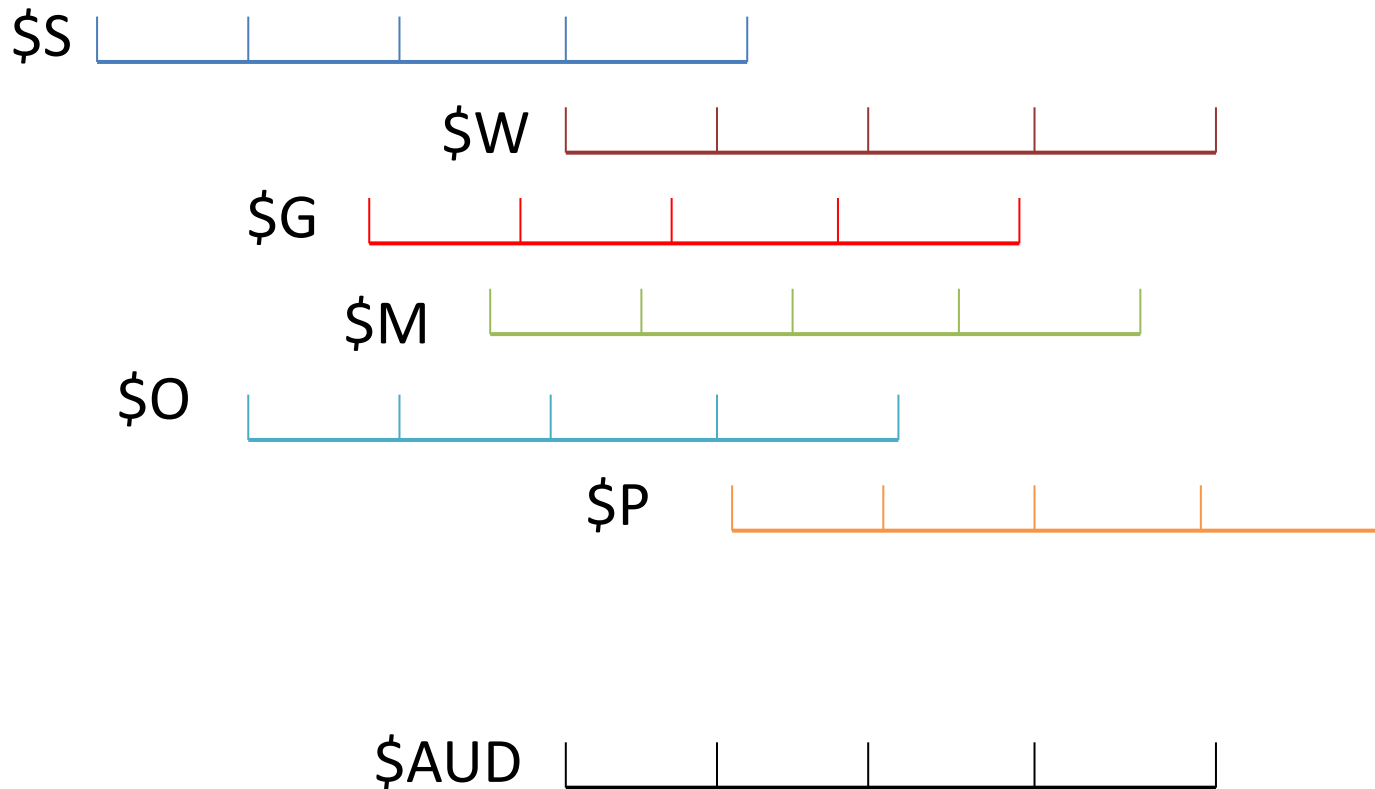
Evaluations

Criteria for assessment are scored or quantified



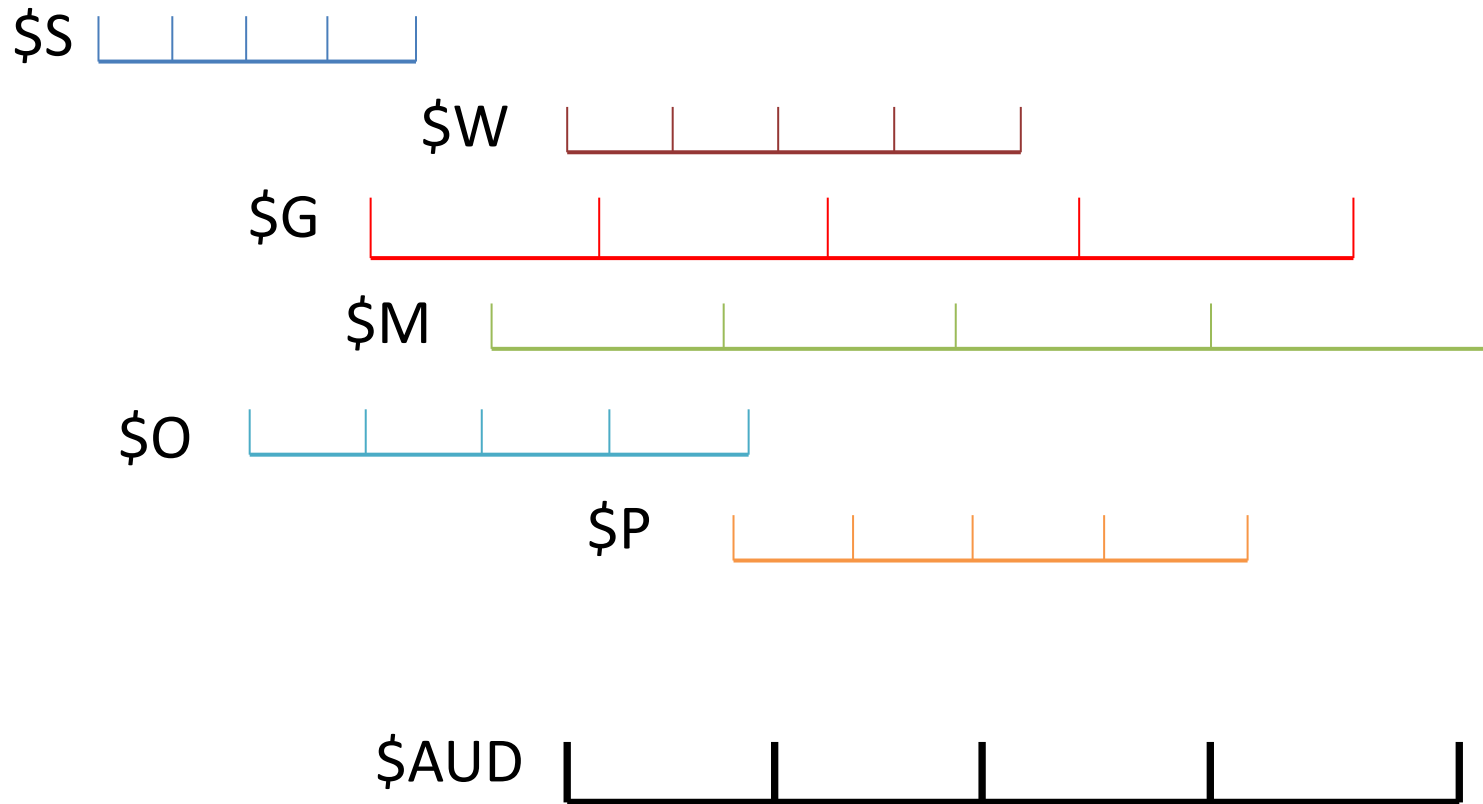
Exchange rates

Weightings for criteria are analogous to foreign currency exchange rates



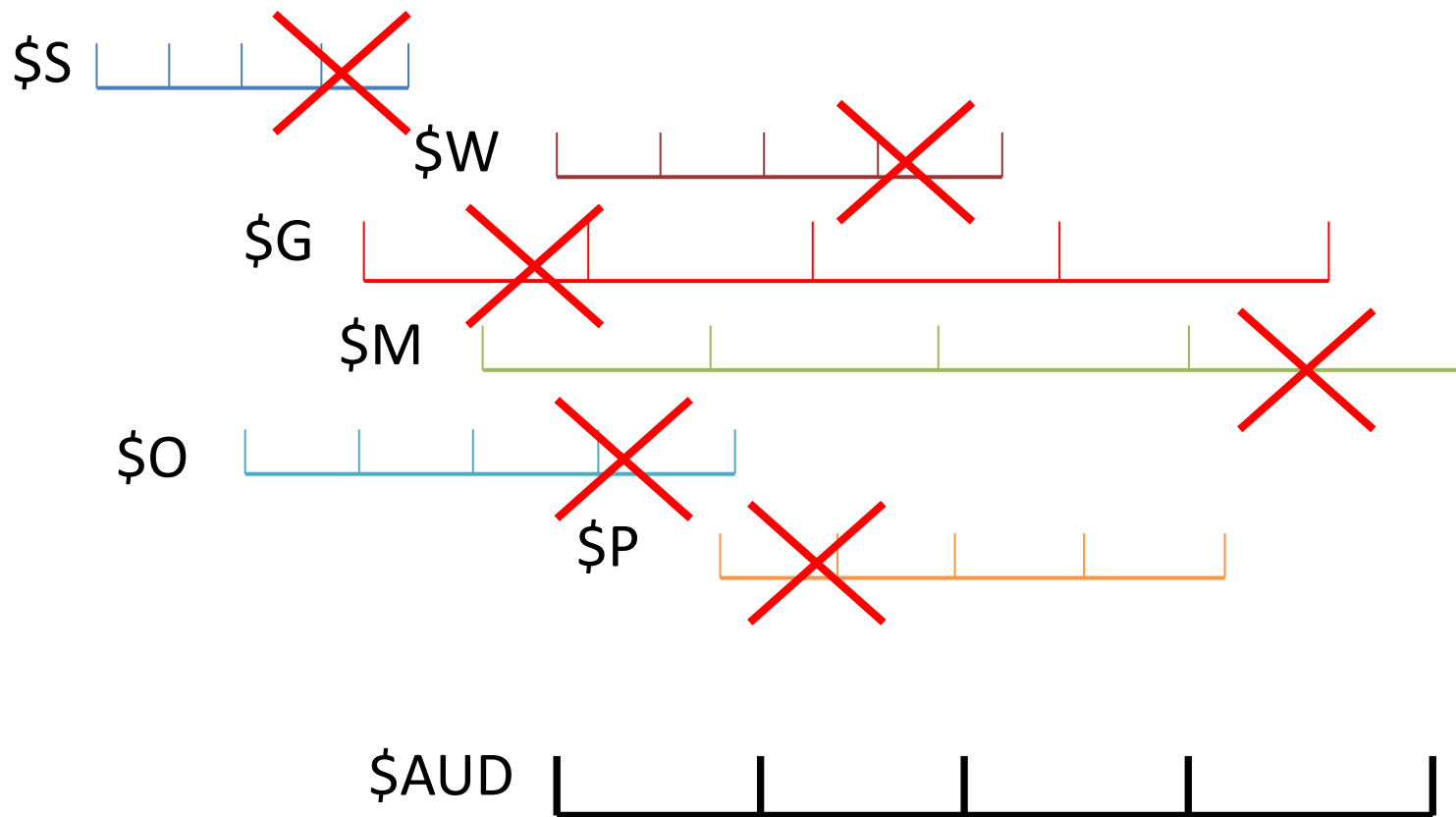
Exchange rates

“Exchange rates” between criteria can fluctuate and have greater or lesser impact on the bottom line



Exchange rates

And some values of any assessment criterion can veto enterprise viability



Exchange rate between pain and production

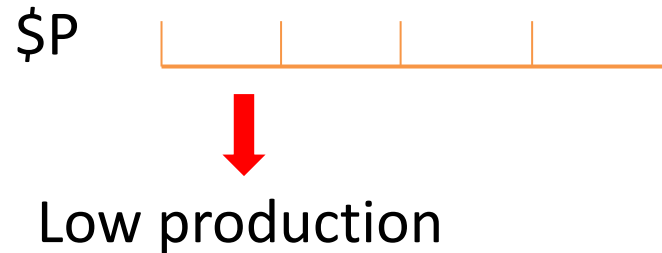
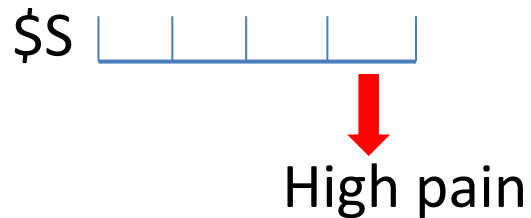
Does pain relief provide a production benefit?

\$S 

\$P 

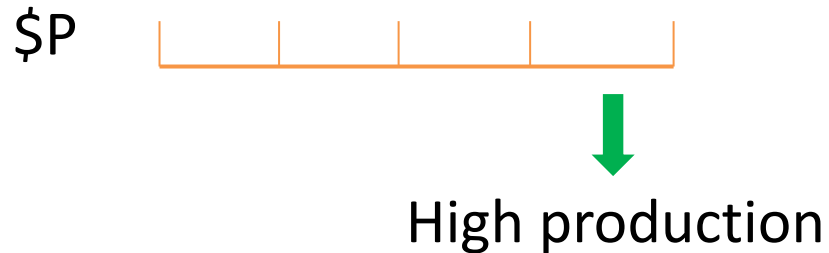
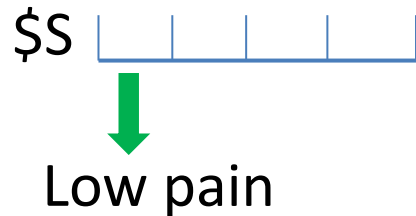
Exchange rate between pain and production

Does pain reduce production?



Exchange rate between pain and production

... and does pain relief provide a production benefit?



Production costs of painful husbandry practices

An area needing more research

- Tissue damage
 - Activates catabolic pathways (redirects energy reserves to host defence rather than growth)
 - Reduces appetite (sickness behaviour)
 - May reduce mothering up
- Duration of effect
 - usually short term
- Surgical husbandry procedures can become a risk factor for mortality when they lead to weaner weights < 20 kg (e.g. *Evans et al Aust Vet J 90:88-96*)

Production costs of painful husbandry practices

- Desirable for analgesia to improve short term benefits
- Analgesics might not be able to prevent weight loss that is caused by tissue damage, inflammation and tissue repair processes
- Analgesics might be to able improve short term survival through improved mothering up
- Need multiple studies over a number of years to quantify these potential benefits
 - Seasonal variations
 - Production benefits or costs may not be seen in all years

Does pain relief provide a production benefit?

This question speaks to the motives for pain relief and hence is a question of ethics

1. Do we provide pain relief to reduce suffering?

or

2. Do we provide pain relief to improve productivity?

Does pain relief provide a production benefit?

Most reasonable expectation might be:

Pain relief is applied to reduce suffering

and

Any improvement in productivity is a bonus

Does pain relief provide a production benefit?

A stronger version of this statement might be:

Pain relief should be applied to reduce suffering

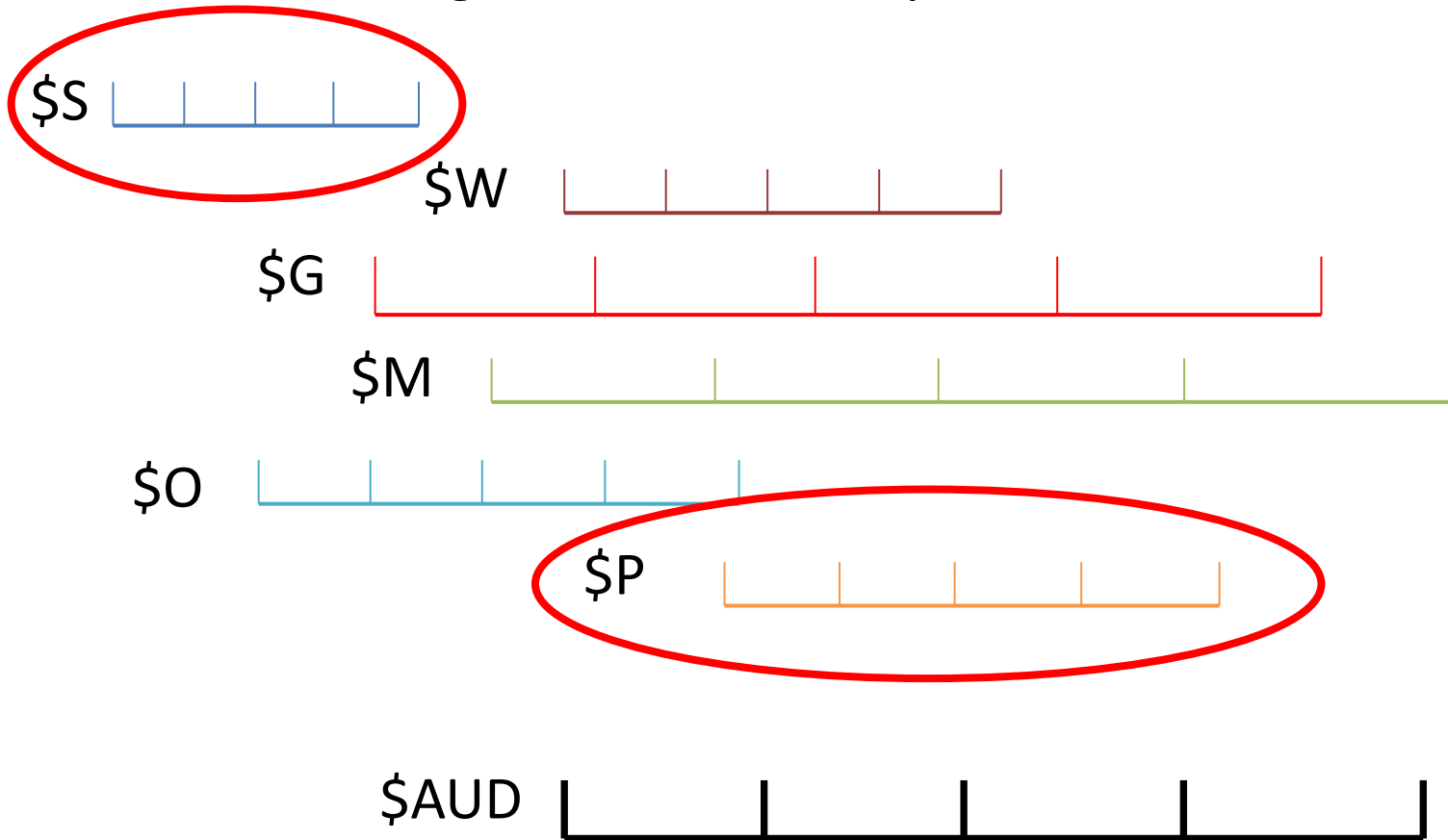
and

No improvement in productivity is needed to justify use of analgesics

An ethical challenge: What if analgesia delivery reduces productivity?

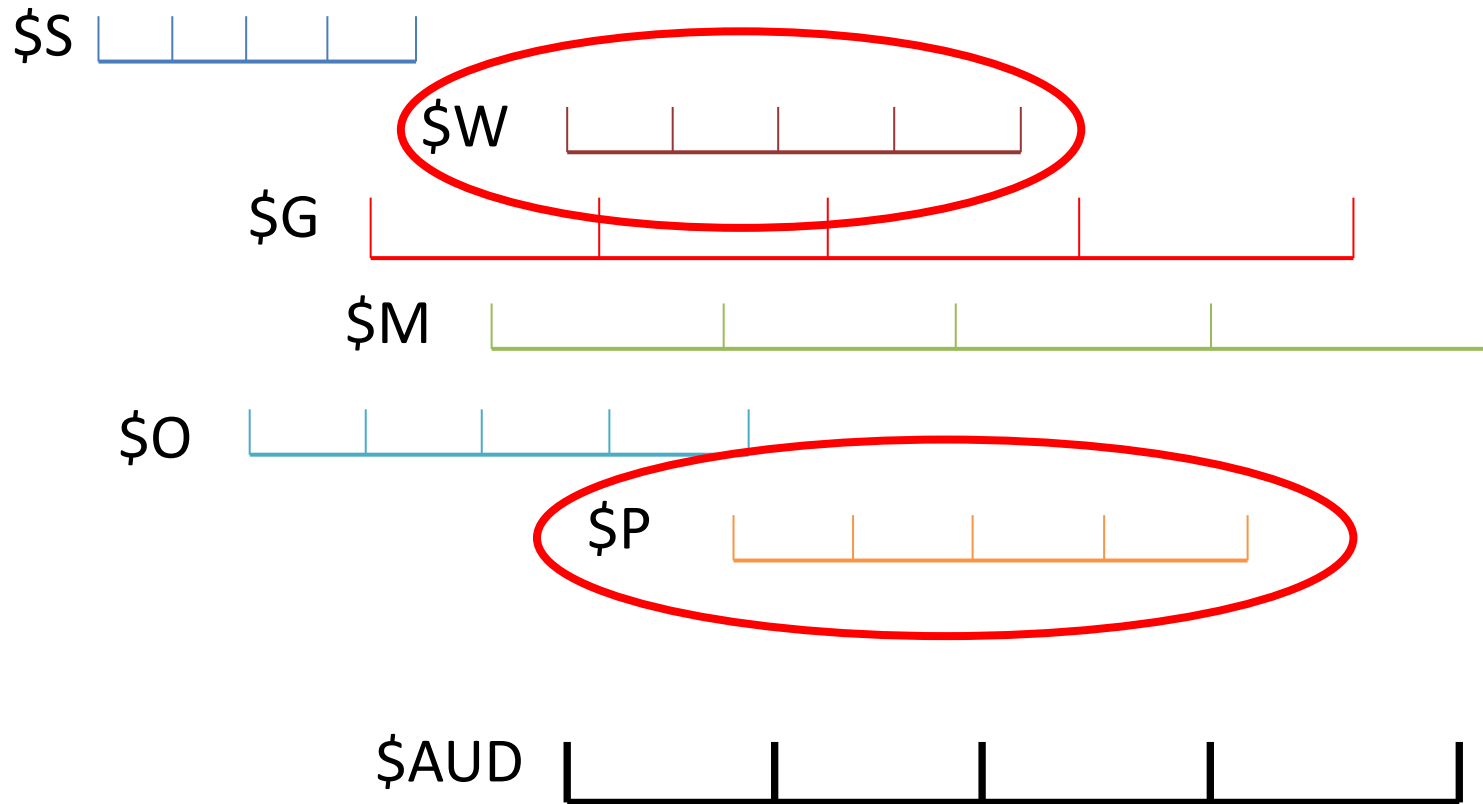
Exchange rates

Focus here has been on short term exchange rate between \$Suffering and \$Productivity



Exchange rates

... and not on the longer term exchange rate between \$Whole-of-Life Welfare and \$Productivity or other criteria



What else needs to be done so producers can provide effective pain relief?

What else needs to be done so producers can provide effective pain relief?

1. Registration of one or more NSAIDs for sheep

NSAID	Dog	Cat	Horse	Pig	Cattle	Sheep
Aspirin	✓		✓			
Carprofen	✓	✓	✓			
Ketoprofen	✓	✓	✓		✓	
Tolfenamic acid	✓	✓	✓	✓	✓	
Flunixin	✓		✓	✓	✓	
Meloxicam	✓	✓	✓	✓	✓	

What else needs to be done so producers can provide effective pain relief?

2. Producer access to NSAIDs if Schedule 4 (cf Tri-Solfen)
3. Develop practical delivery methods
 - Needleless devices
 - Drug delivery via rings (Massey University, NZ)
 - Optimise timing and handling logistics
4. Develop more effective drug combinations
 - U of Sydney / Bayer / Animal Ethics: Tri-Solfen + xylazine
 - Other companies also likely to be active
 - Local anaesthetics + NSAID

What else needs to be done so producers can provide effective pain relief?

5. Extend duration of pain relief
 - Longer acting formulations
 - Self medication
6. Better accounting of the production costs of surgical husbandry procedures and production benefits of pain relief
7. Continue the discussion of ethical practices

The discussion of ethical standards and practices

Complete pain control is usually not possible in humans or farm animals. What is an acceptable benchmark?

How much pain is too much pain?

Unlikely to be a single answer to this question - the benchmark is likely to change with time and with the tools available

Compare pain control with partial control provided for:

- Internal parasite infections
- Subclinical mastitis and lameness in dairy cows
- Ticks and buffalo flies in cattle



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