

# Is Perennial Cover Cropping possible ??

*Colin Seis*

**How do we change??**





Our farms, soil, and animals  
should be nurtured

We have isolated ourselves from nature

**The way we grow crops and graze  
animals is not working.**

**We need to change!!!!!!**

# How and why did I change??





# Industrialized, high input, farming methods

*From 1948 to 1978 on 'Winona'*



Fertiliser &  
pesticides were  
costing over  
\$80,000 annually

20 years after the adoption of 'Green Revolution Agriculture' the farm started to crash



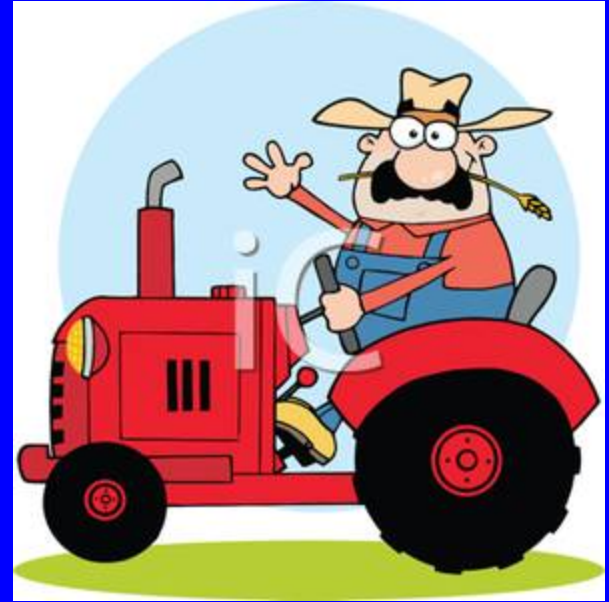
*This method of agriculture was  
destroying the farm ecosystem  
and sending us broke*





**How did I fix these problems and be  
profitable???**





**During the 1970s the cost of farm production  
was becoming high and unprofitable.**

**BUT !**

# Major wildfire destroyed Winona 1979

Winona Homestead 1979



Winona sheep shearing Shed 1979

- 3000 sheep killed
- All buildings destroyed
- 30 miles of fencing burned
- No money

# How did I survive??

- 1000 ewes survived and rebuild sheep numbers
- Grew wheat
- Learned to have a sense of humour



**Because of the fire I had no money and few livestock  
I decided to grow more crops.**

- **Plowing, and cultivating the soil created:**
- **Poor structured soil.**
- **Soil erosion**
- **Acid soil.**
- **Declining Soil Carbon.**
- **Crop disease.**

**Like my fathers era, this method eventually failed**

# **In 1985 I started to zero till crops.**

- Weed control with 'roundup' in November.
- 3 - 4 more herbicide applications pre sowing.
- Herbicide applications in- crop
- High rates of N & P fertiliser at sowing.
- Grain yields good at first.
- **I had replaced the plow with herbicide**

Things started to go wrong,

**Declining yields, crop disease, insect attack.**



# How did I fix the problems?

The agronomic advice in 1990 was:

- Double N&P fertiliser rates.
- Add Urea.
- Use fungicides
- Insecticides.
- Better weed control with more herbicides.



# I did not accept the advice.

- It did not add up, financially.
- The recommended amount of Nitrogen fertilizer was toxic to wheat plants.
- There was something seriously wrong if fertilizer had to be increased to a point where it became toxic to the plant.
- **How did I solve these problems??**







# How did I change

- Developed low input agriculture methods.(1980s)
- Stopped using pasture fertilizer and pesticides (1980)
- Focused on 100% ground cover. (*crops and pasture*)
- Adopted 'Holistic planned grazing' 1993
- Developed 'Pasture Cropping' in 1993
- Combined 'Pasture Cropping' and 'Holistic planned grazing' in 1995
- **Focused on restoring Winona to grassland.**



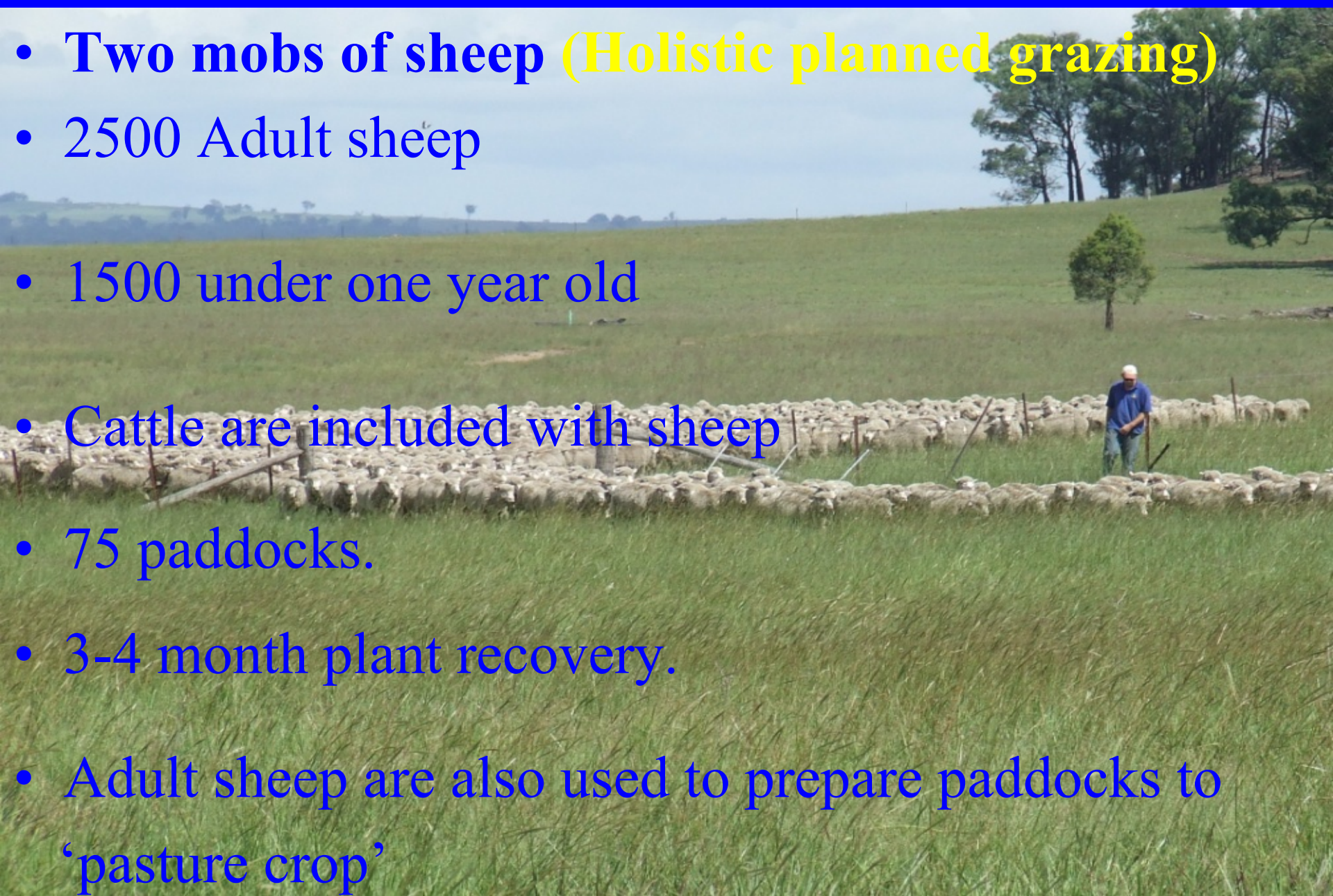
# Grazing Management





# Winona Grazing Management

- Two mobs of sheep (Holistic planned grazing)
- 2500 Adult sheep
- 1500 under one year old
- Cattle are included with sheep
- 75 paddocks.
- 3-4 month plant recovery.
- Adult sheep are also used to prepare paddocks to ‘pasture crop’













# Pasture Cropping



***“Pasture Cropping was invented and developed  
in 1993 by Colin Seis and Daryl Cluff.***





**‘Pasture Cropping’**  
is a perennial Cover  
Cropping technique  
where annual crops  
are zero - tilled into  
dormant perennial  
grass or grassland.



*There are over 3 million acres  
‘pasture cropped’ around  
the world*



For 10,000 years we have killed  
grasslands to grow crops.

‘Pasture Cropping’ is the first cropping  
technique developed where crops are  
planted into perennial grass.

# Why haven't crops been planted into perennial grass before?

- It was known that annual plants will compete with each other. (wheat & annual grass)
- It was assumed that perennial plants would also be incompatible with cereal crops.
- Crop disease
- No one had looked at how nature worked in a grassland (Warm season and cool season plants are compatible)



**‘Pasture Cropping’ is  
perennial cover cropping**

- Cover Cropping uses an annual crop to create mulch, control weeds and improve soil health.
- 'Pasture Cropping' uses perennial grass to create mulch, control weeds and improve soil health.



# The way crops are grown using plows or excessive herbicides & pesticides

- **Kill grasslands**
- **Destroys the soil ecosystem**
- **Destroys the farm ecosystem**





# Traditional cropping methods.

## *Plowing or Herbicides*

While this paddock is being prepared for sowing!!!

How much stock feed is produced?

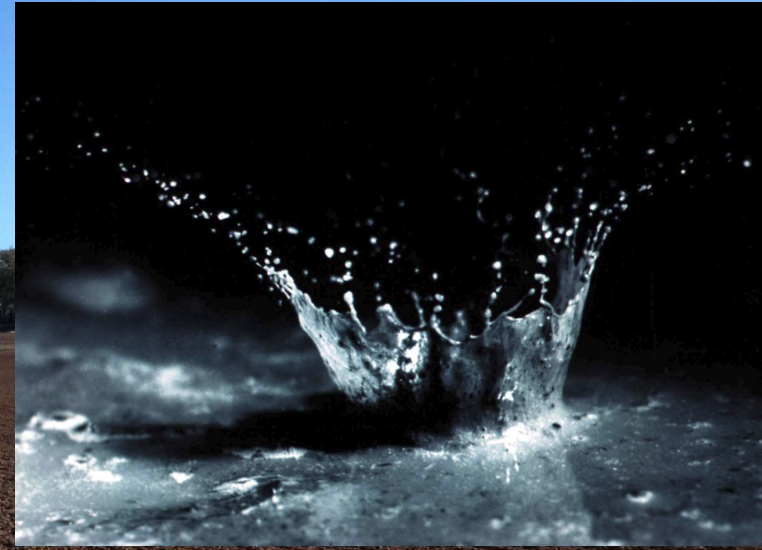
How much pasture is destroyed?

How much soil structure is destroyed?

How many nutrients are lost?

How much carbon is lost

How much soil is lost to erosion.





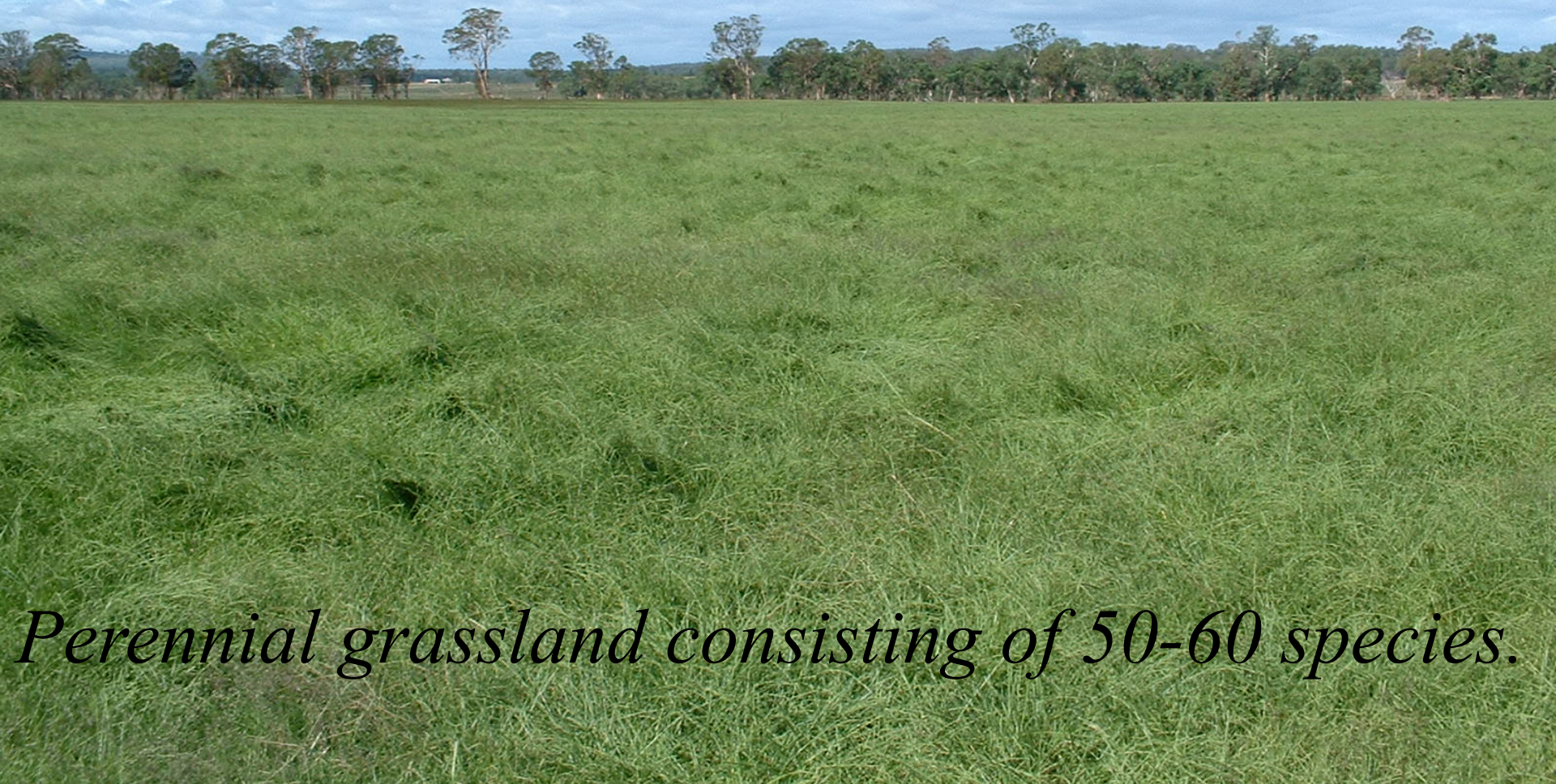
# *Pasture Cropping*

Grazing and cropping are combined and managed in a way where each one benefits the other.





# Pasture Cropping



*Perennial grassland consisting of 50-60 species.*

February (*Summer*)



# Pasture Cropping



**Harvesting native grass seed (*Summer*)**



# Pasture Cropping



*After grazing with sheep and/or Cattle, zero-till plant the crop into litter and mulch of dormant C4 perennial grass.*

Sowing Oats



A photograph of a rural landscape. In the upper left corner, the front of a white utility vehicle is visible, parked on a dirt path. The rest of the image is filled with tall, dry, yellowish-brown grass. In the center of the grassy field, a white and red baseball cap lies on the ground. The text 'Pasture Cropping' is overlaid in yellow at the top right.

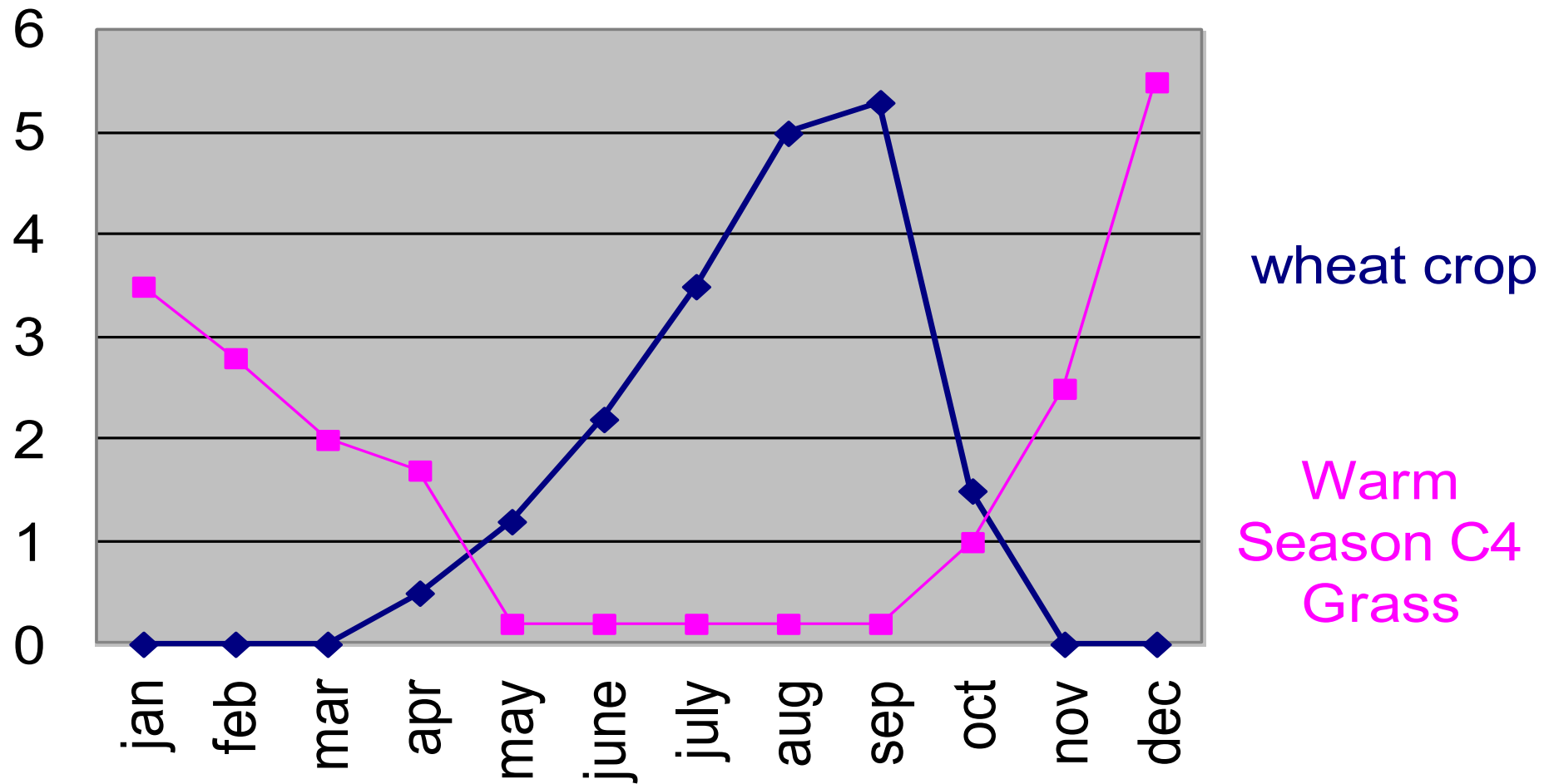
# Pasture Cropping

*No herbicide is required with this much litter*

Sow crop into litter



# Crops are usually growing during the pastures natural dormant period





# Pasture Cropping



Emerging Crop



# Pasture Cropping

*The crop can be grazed by animals*



Spring



# Pasture Cropping

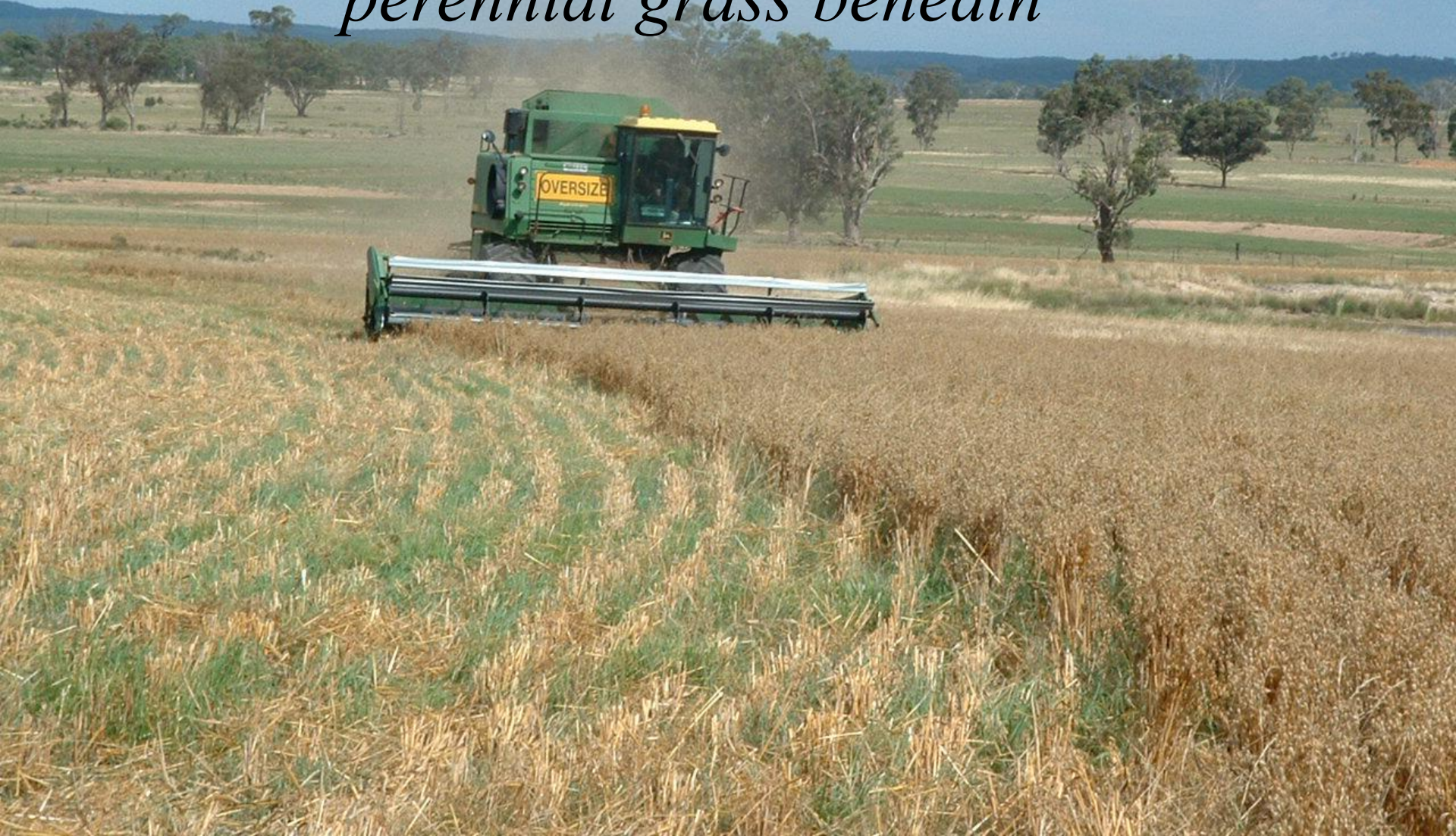


Spring



# Pasture Cropping

*Harvest the crop with emerging  
perennial grass beneath*





**After grain  
harvest,  
native summer  
grass provides  
excellent  
stock-feed**





*Graze grassland after the crop is harvested (summer)*





**Native grass seed is harvested after the cereal crop is harvested and before the crop is sown**



**Seed is sold for re-vegetation and, in the future, will be sold for human consumption**



# Pasture Cropping can:

- Produce crops for grain and/or grazing
- Improve pastures by stimulating perennial grass species and species diversity.
- Improve soil health and increase soil organic carbon.
- Improve the farm ecosystem





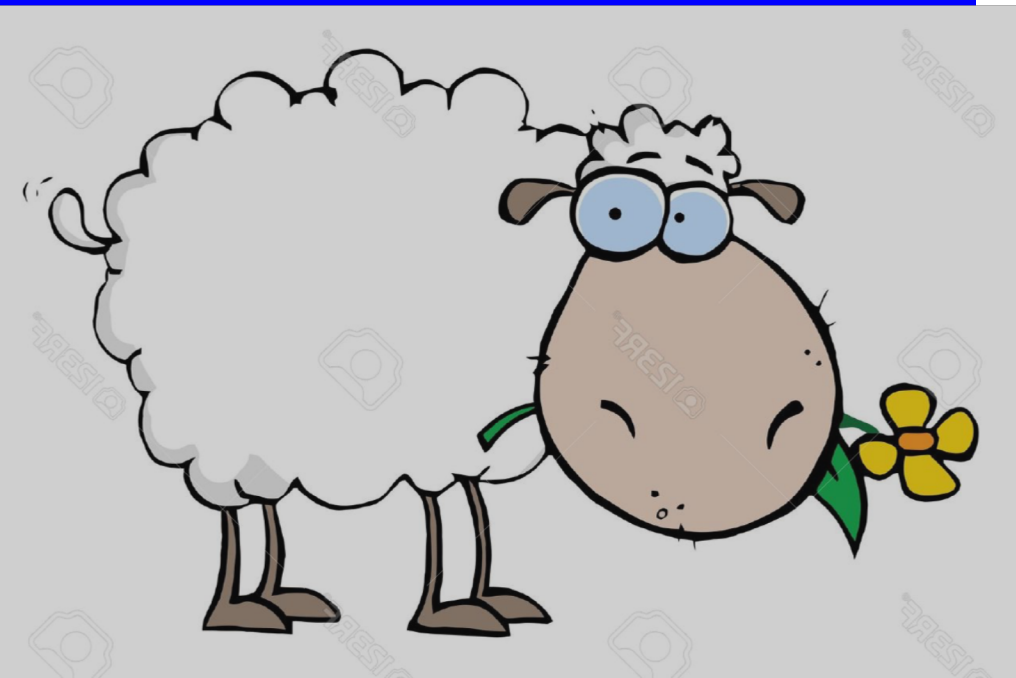
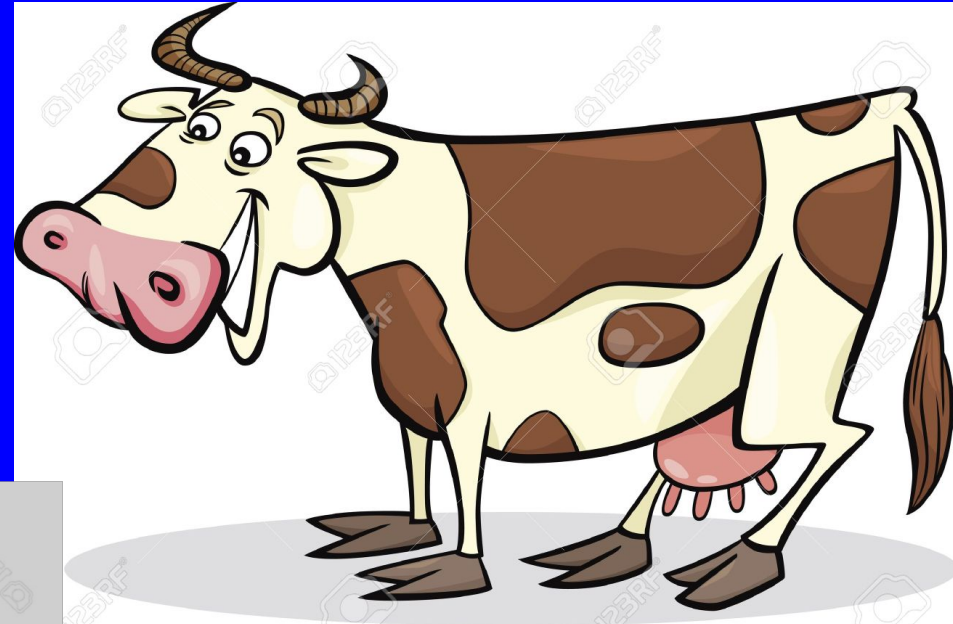
*What's next?*

# Multi-Species Pasture Cropping





We should have never removed  
animals from agriculture



- Profit
- Nutrient Cycling.



# How do we produce excellent quality forage ?

- **Restore grassland /pasture.**
- **Reduce fertiliser.**
- **Reduce herbicides.**
- **Reduce insecticides.**
- **Reduce fungicides.**
- **Improve soil structure**
- **Improve soil health.**
- **Improve soil nutrients.**



# Multi Species Pasture Cropping



*After grazing & mulching with sheep and/or Cattle, zero-till a multi species crop into litter and mulch of dormant warm season perennial grass.*

**Sowing multispecies crop**



# **Multi Species Crop**

**Oats**  
**Brassica**  
**Vetch**  
**Radish**  
**Clover**  
**pea**  
**Turnip**





# A mix of 4 to 10 species are sown into a dormant grassland.

- Produce superior quality and quantity stock feed.
- Faster improvements in soil health, soil structure, carbon and nutrient cycling.
- Add Nitrogen with legumes & scavenge other nutrients.
- Weed control.
- Insect control (*flowering plants attract beneficial insects*)
- Harvest cereal crop after grazing



# Multi Species Pasture Cropping

*Improved Grazing /Better diet*

- Faster fattening
- Faster growth rates
- More feed





# Multi Species Pasture Cropping



Oats, vetch, radish, pea, turnip, clover, forage brassica sown into grassland. ( September)



**Harvest multi-species crop for grain.**



**Summer**





**Grain from Multi species crop**



# Multi Species Pasture Cropping

## *Harvesting Grain*





**Graze grassland after the crop is harvested**







Grassland during winter - following year



**Native grass seed can be harvested after the  
cereal crop is harvested and before  
the crop is sown**



**Seed is sold for re-vegetation  
and, in the future, will be sold  
for human consumption**



# Over a 12 month period the paddock has produced

1. Grazing of grassland (*pre sowing the crop.*)
2. Grazing of the crop (*sheep & cattle*)
3. Grain from the crop
4. Vegetables.
5. Grazing of grassland after harvest (sheep & cattle)
6. Native grass seed.
7. Improved soil structure, soil health and nutrient cycling.
8. Insect and crop disease control.
9. Reduced or no fertiliser
10. No insecticide
11. No fungicide
12. No plowing

**13. Restored Grassland & Soil**





# Pasture Cropping Trials and Research





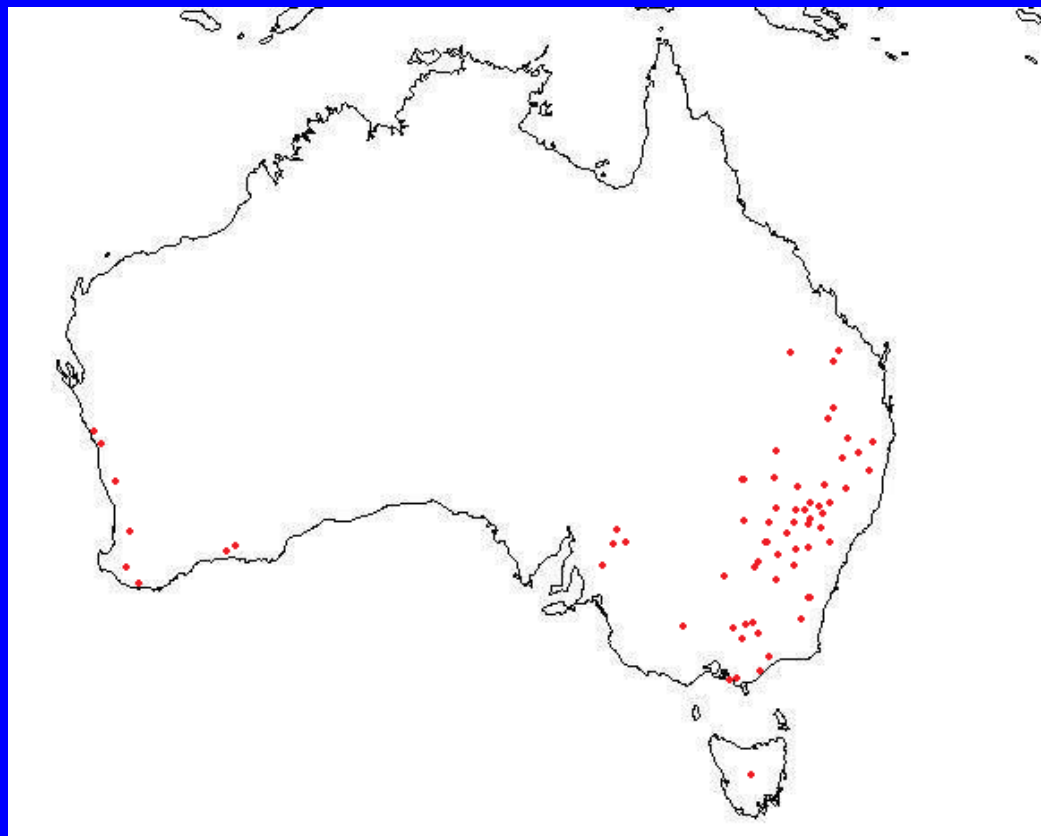
**Agriculture, and sound ecological practices should function together**





# There are over 3 million acres 'pasture cropped' around the world

- On rainfall over 800 mm and below 250 mm
- On all soil types where crops can be grown
- In cropping areas
- In grazing areas
- An increasing number are not using chemicals





# Sydney University research results

Ecological study, Winona 2010 (*Dr. Peter Ampt*)

*Fence line comparisons of “pasture cropping” & time control grazing compared to continuous grazing and conventional cropping*

- Increase perennial grass by 71% (82% compared to 11%)
- Almost double soil organic carbon
- Almost double nitrogen
- Double soil microbial number
- Better water infiltration
- Better nutrient cycling
- Double sheep numbers.





# “Pasture Cropping” (Pasture - Wheat Intercropping)

## Research by “The Land Institute” Kansas USA

*J Glover, J Duggan, L Jackson*

Comparing ‘Pasture Cropping’, No-till, & Hay production.  
**Some of the Results were:**

- ‘Pasture Cropping’ grain yields were 20% less
- ‘Pasture Cropping produced more hay
- ‘Pasture Cropping’ improved soil health
- ‘Pasture Cropping’ increased perennial plant diversity
- **Pasture Cropping’ was more profitable.**

*Pasture Cropping: \$82/ac, No till: \$50/ac, Hay: minus \$29/ac*





# **‘Pasture Cropping’ has been shown to improve existing pastures and restore grasslands**

- **‘Pasture Cropping’ does this by stimulating perennial grass recruitment from seed in the soil.**

## **How?**

- **Small soil disturbance while planting**
- **Root Exudates from the crop**
- **Improvement in soil health.**
- **Micro-climate created by the crop**

# Our Farms should function as ecosystems





# Agriculture does not have to destroy farms, and the planet.

## Good agricultural practices can:

- Restore our farms
- Restore soil ecosystems
- Supply and cycle soil nutrients.
- Control insect damage & plant disease
- Produce vast amounts of good quality food.



**But:**



**Agricultural practices  
need to function closer to  
how Nature had it  
originally designed.**