

SHEEP CONFINEMENT & DROUGHT FEEDING WORKSHOP & FARM WALK



The SQNSW Innovation Hub receives funding from the Australian Government's Future Drought Fund. The Farm Business Resilience Program is jointly funded through the Australian Government's Future Drought Fund and NSW Department of Primary Industries.

1

Pen design,
Infrastructure,
Shade,
Social stress,
Water

2



3

A photograph of a rural landscape with a field, trees, and a building, overlaid with the text "Site Selection" and a list of factors to consider for site selection.

Site Selection

Your site should take into account

- Slope and Soil type
- Distance to water courses, neighbours
- Water quality and supply
- Distance to yards/storage etc
- All weather access
- Shelter and
- Shade

4

Soil type

- Medium clay loams are preferred
- Heavy clays 'pug' in wet weather and dry slowly increasing odour and welfare problems
- Sandy/light soils have high infiltration rates and are prone to erosion
- Optimum slope 3-4%

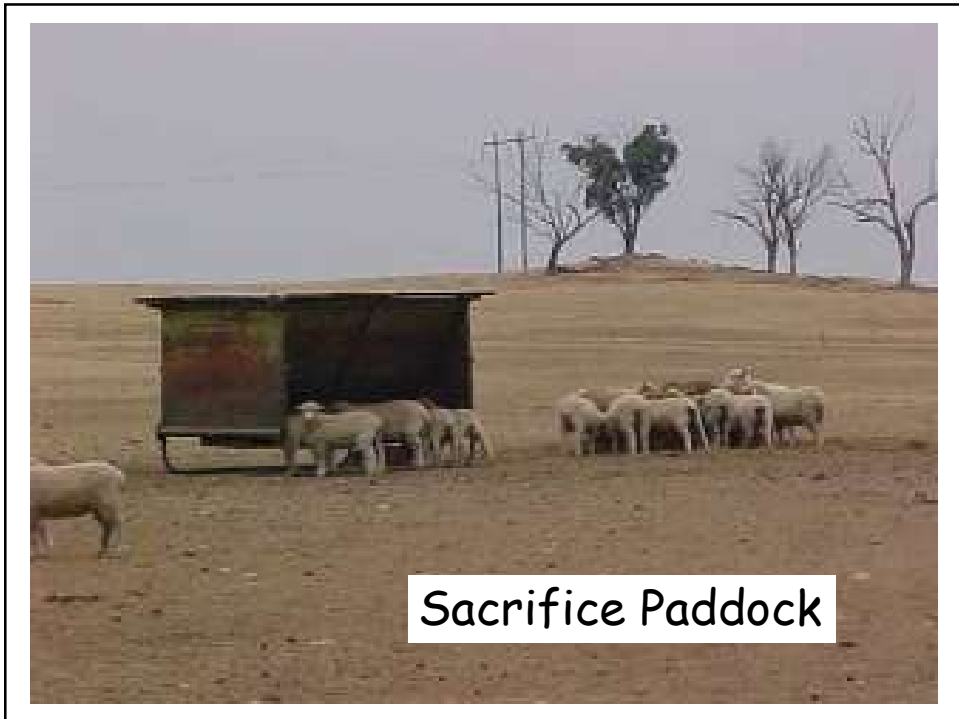
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Opportunity Feedlotting

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Opportunity Feedlotting

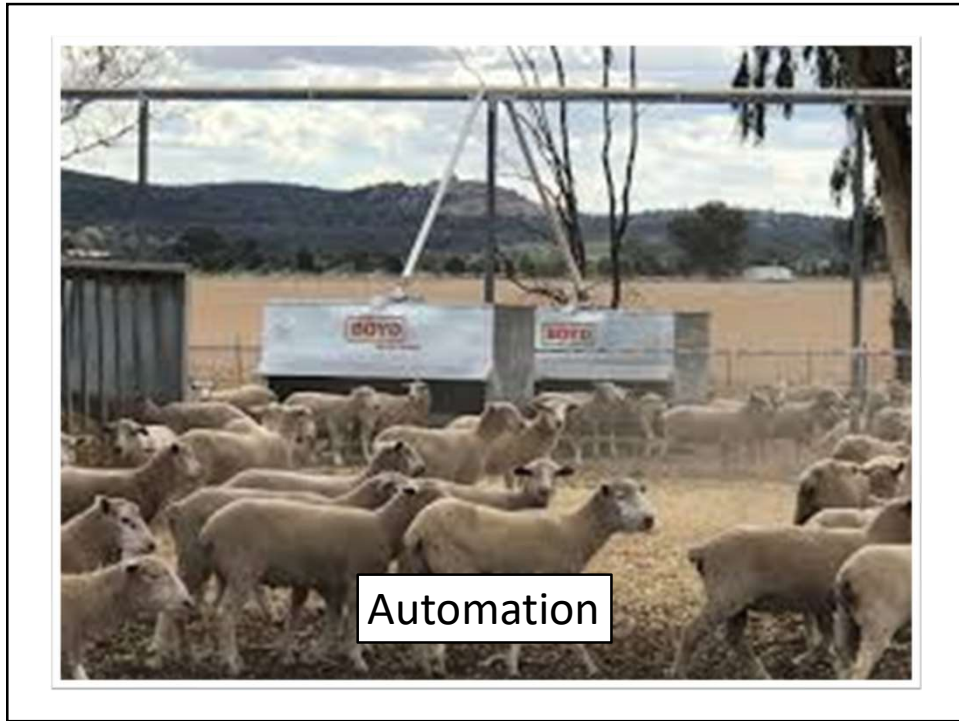
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Confinement Design

Design will depend on:

- Area available
- Numbers per pen and pen number
- Capital input
- Labour and equipment
- Personal preference

14

Pen Design

Pen design should:

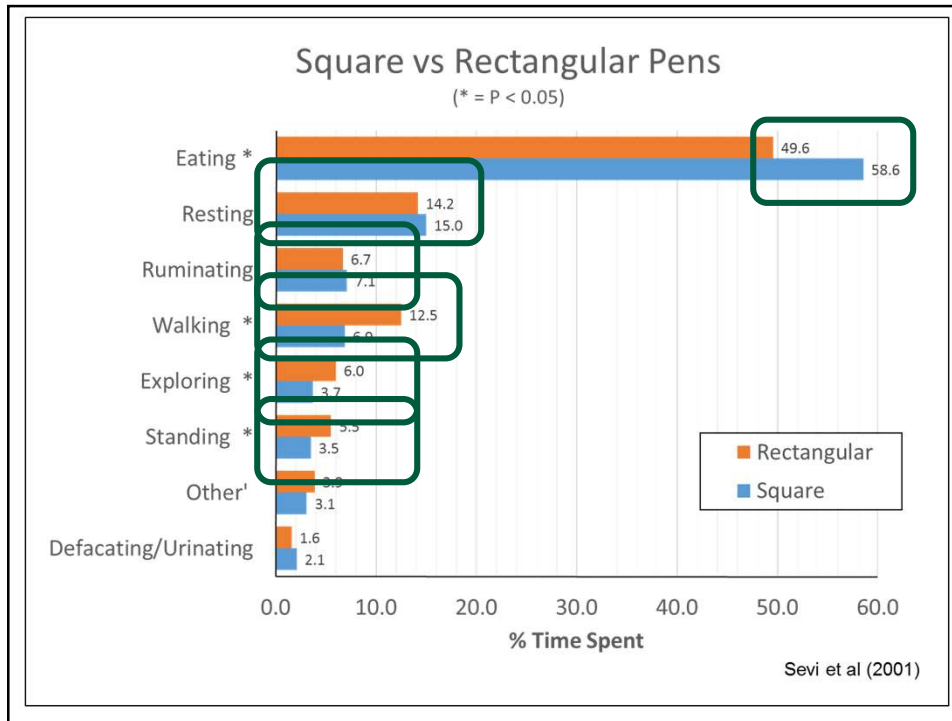
- minimise labour
- minimise water contamination
- maximise trough allocation and
- reduce social stress

15

Pen Design

Findings from a grazing trial (Sevi et al 2001; 10m²/ewe) suggest that square pens may be better than rectangular in terms of productivity

16



17

Area – Sheep/Cattle

Suggested minimum stocking densities

- Sheep or lambs 5m²
- Weaners 9-10 m²
- Yearlings 12-14m²
- Cows 15-25 m²
- Cows/calves 100 m²+

(small paddocks preferred)

18



Area

Increasing area/animal may

- improve feed intake and FCE
- reduce shy feeder number provided adequate trough space per animal

Reducing area/animal may

- reduce dust on heavier soils but may also increase health/disease issues
- Increase stress/shy feeders

19



Keep it simple:

Confinement areas do not need
to be costly to be functional !!

If possible use what you have
on-farm

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Tyres

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Tyres

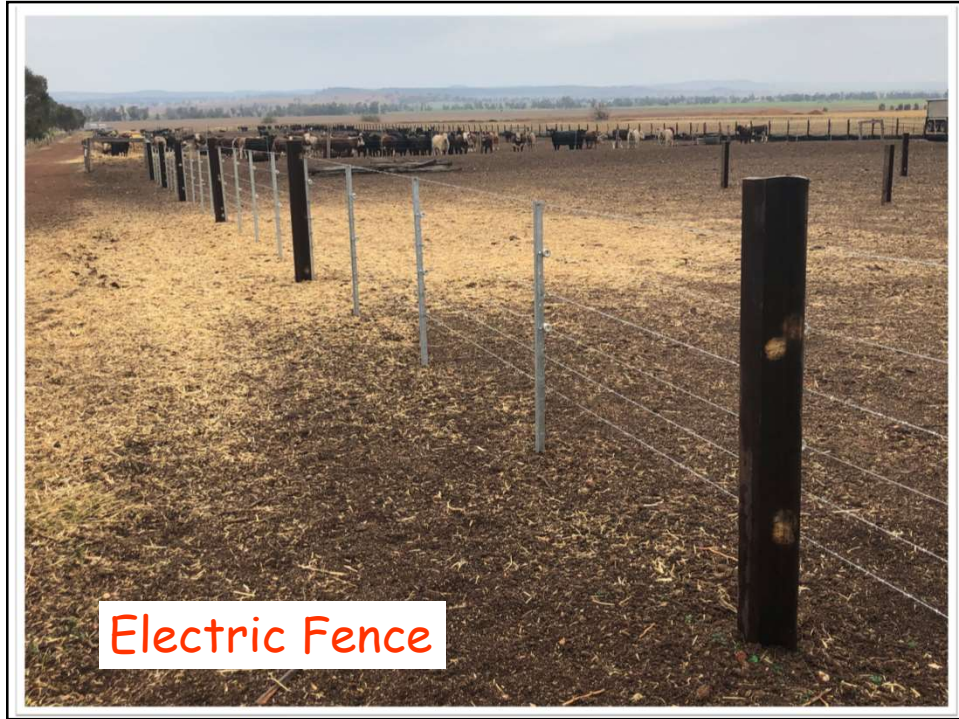
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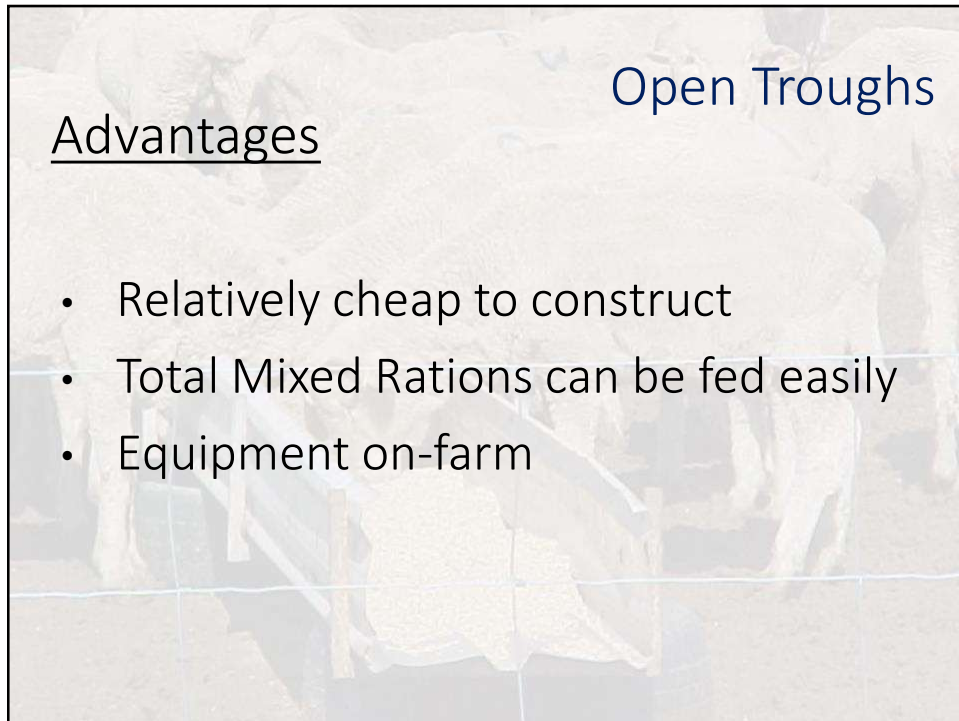
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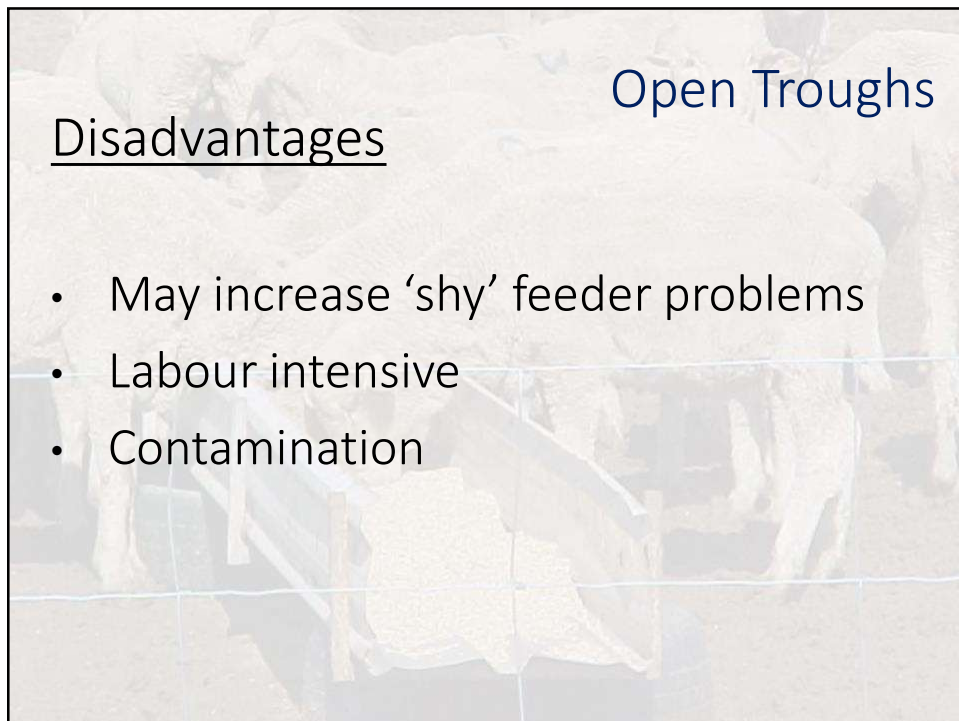


Open Troughs

Advantages

- Relatively cheap to construct
- Total Mixed Rations can be fed easily
- Equipment on-farm

31



Open Troughs

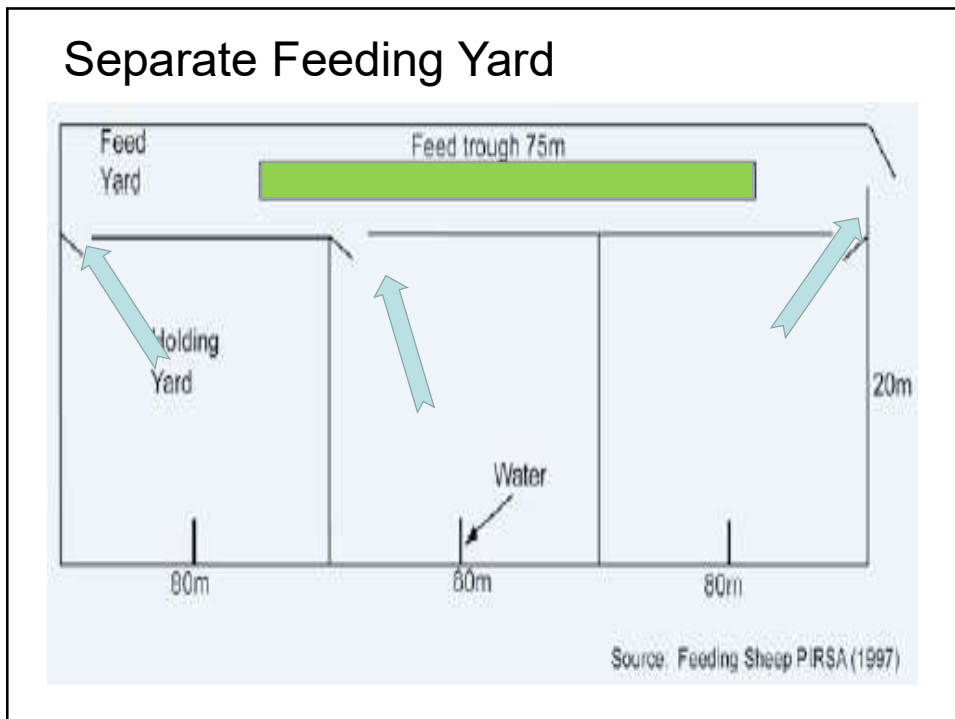
Disadvantages

- May increase 'shy' feeder problems
- Labour intensive
- Contamination

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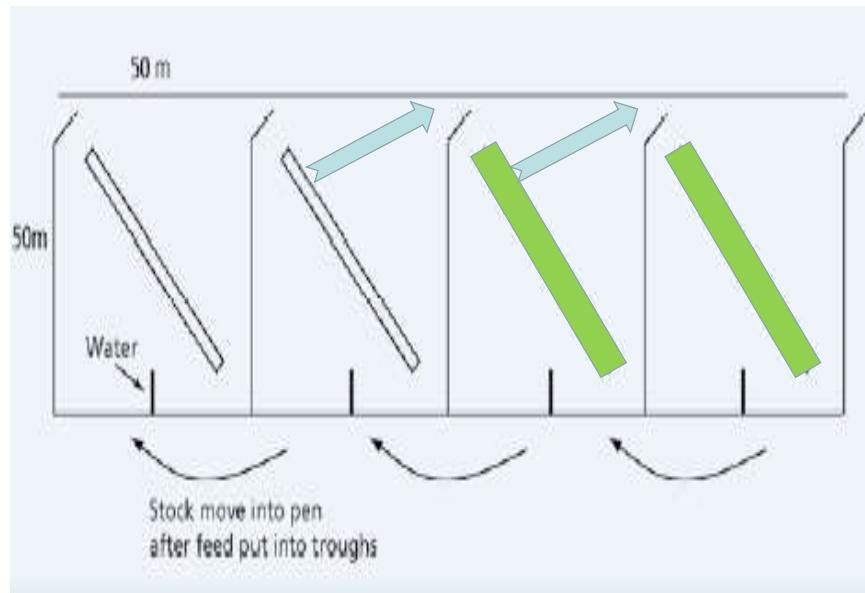


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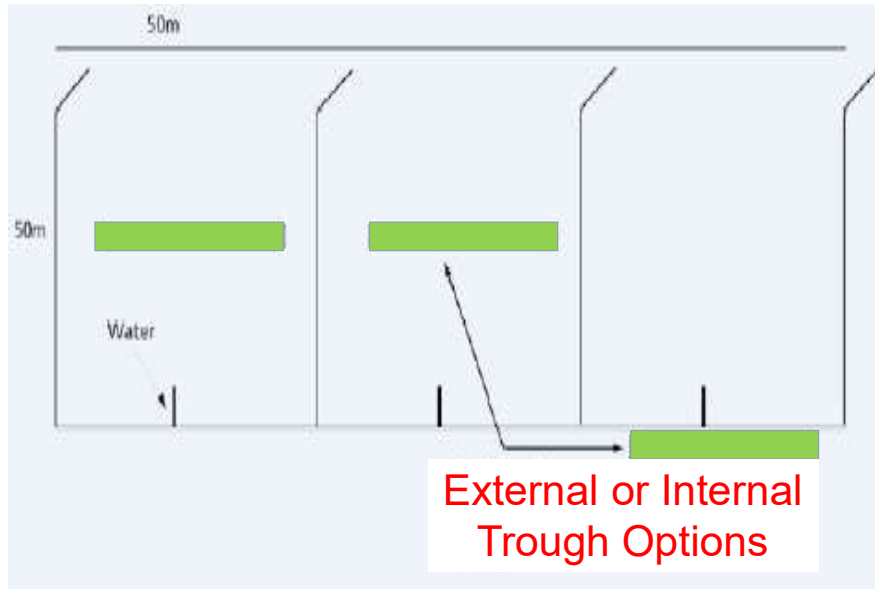
34

Pen Rotation System



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Individual Yards



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Trough Space Recommendations (Sheep)

Troughs

- single side access 30+ cm
- double side access 15+ cm

37



Open Troughs

Recommendations:

- Adequate trough space per animal may reduce bullying and shy feeders
- Feed early morning
- If feeding every 2nd or 3rd day be wary of acidosis risk

38



Open Troughs

Recommendations:

Acidosis risk can be reduced by

- * feeding roughage on day prior to feeding grain
- * feeding roughage ad lib
- * using effective buffers

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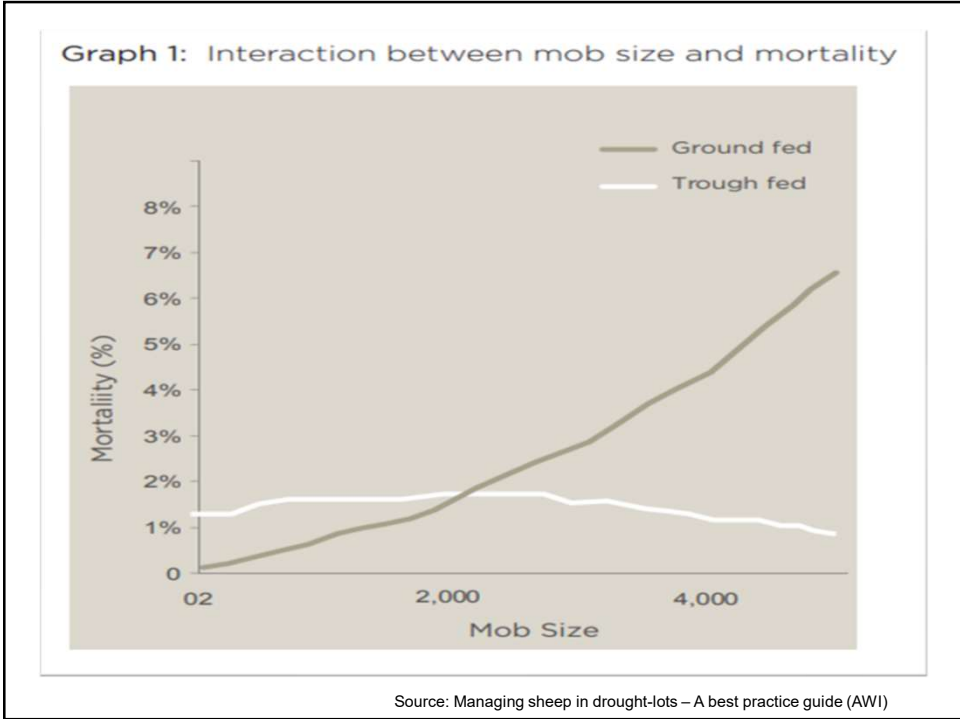


Trail Feeding vs Troughing

Disadvantages include:

- Grain waste may be 15-20%
- Accidental deaths if internal feed
- Increased likelihood of health problems
(Salmonellosis, Coccidiosis, Sand Impaction, Pneumonia and Pinkeye)

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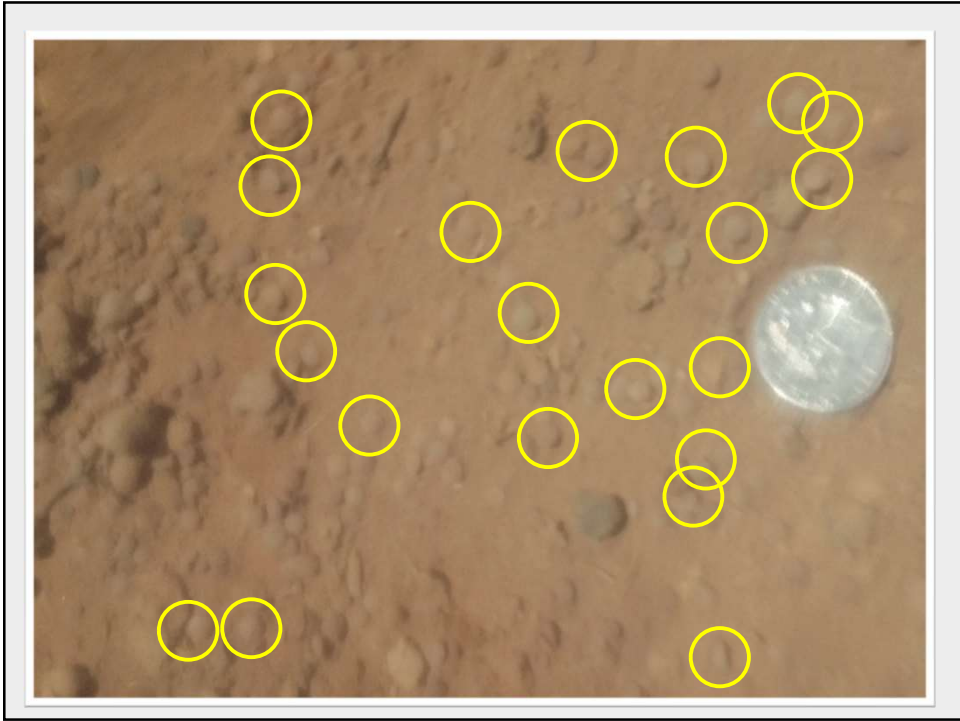
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Open Troughs

Recommendations:

Central vs fenceline trough location

- **80%** of the sheep began eating by Day 2 when a central trough vs Day 7 for fenceline trough
- **78%** of sheep eating daily compared with 67% for fenceline troughing

Barnes et al (2008) MLA/Livecorp Review

47



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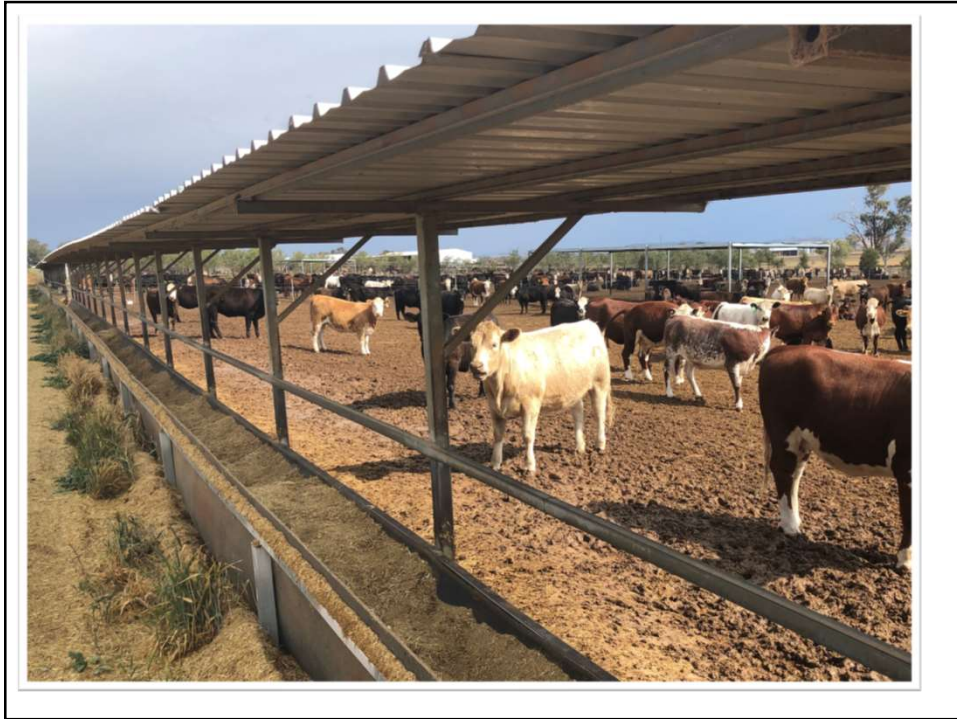
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Conveyor belting

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Conveyor belting

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Conveyor belting

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Conveyor belting

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Conveyor belting

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'Forks' for bending cut conveyor belting into a trough form (see next slide)

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Tarpaulin/Plastic

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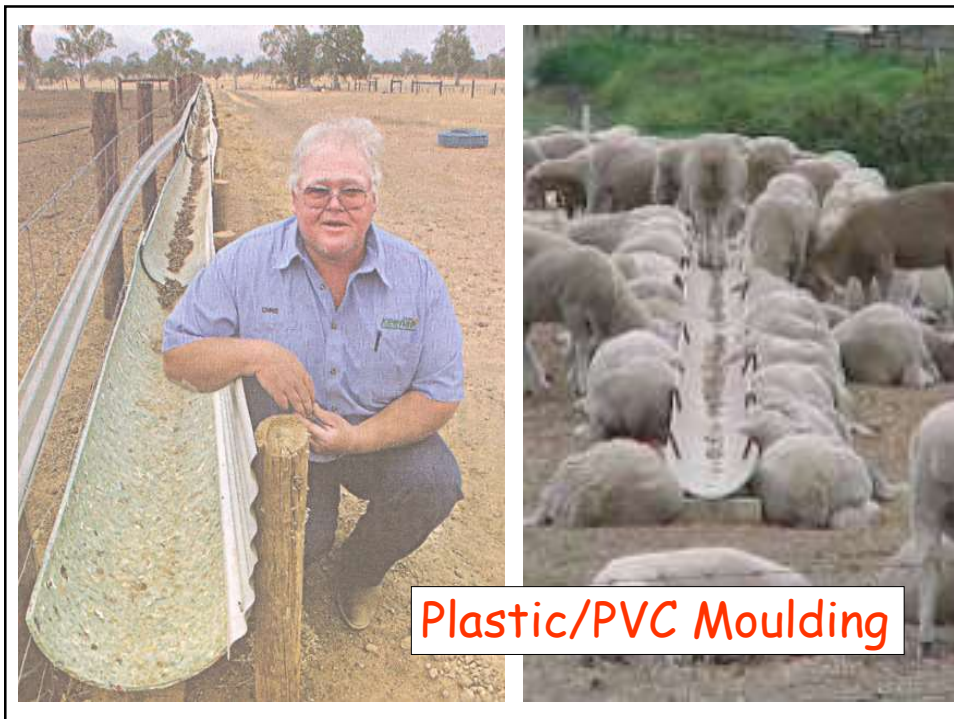
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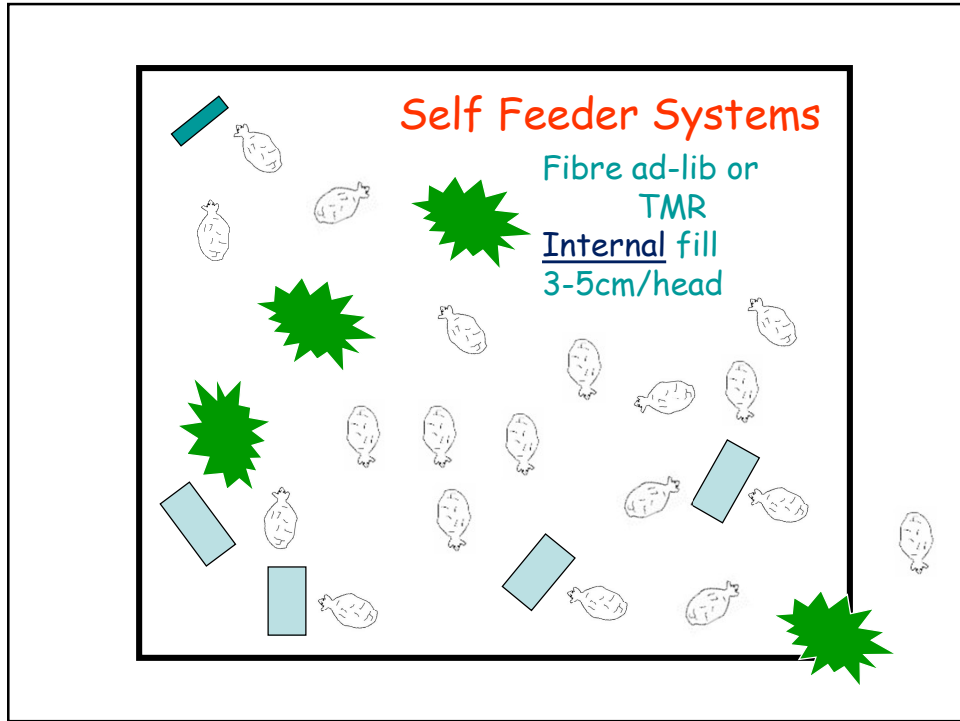
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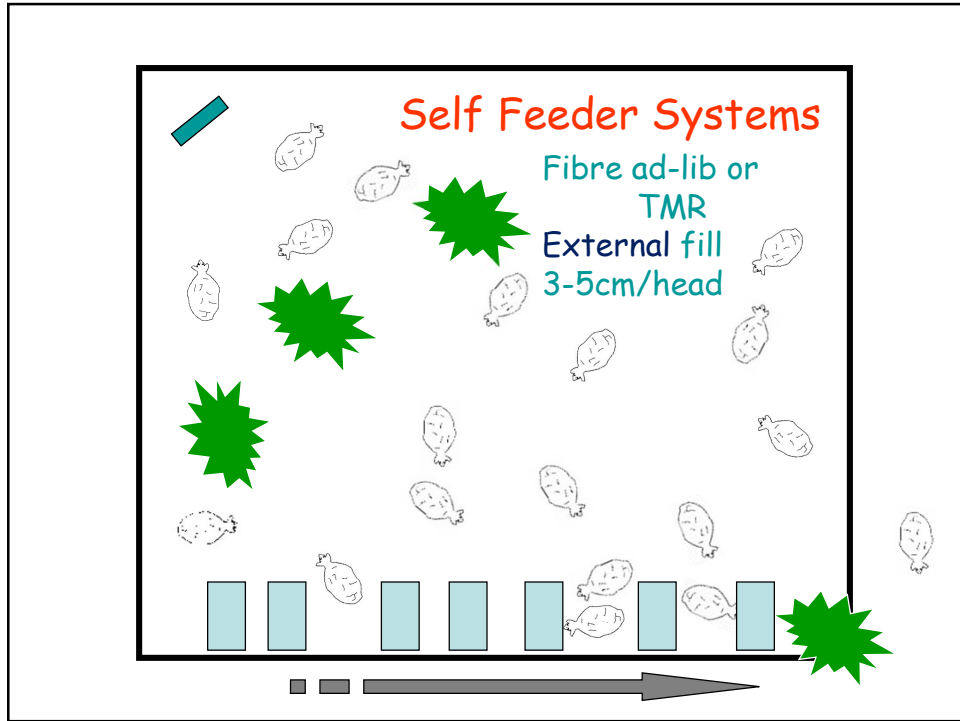
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Self Feeders

Advantages

- Feed always available
- Reduces labour
- Greater intake, wt gain and FCE
- Possibly reduce shy feeders

94



Self Feeders

Disadvantages

- Difficulties changing grains or ration mix
- Can be expensive
- Issues feeding Total Mix Rations

95



Self Feeders

Disadvantages

- Can be costly to establish
- Stock may substitute roughage for grain
- May increase acidosis risk
- Issues with hay delivery

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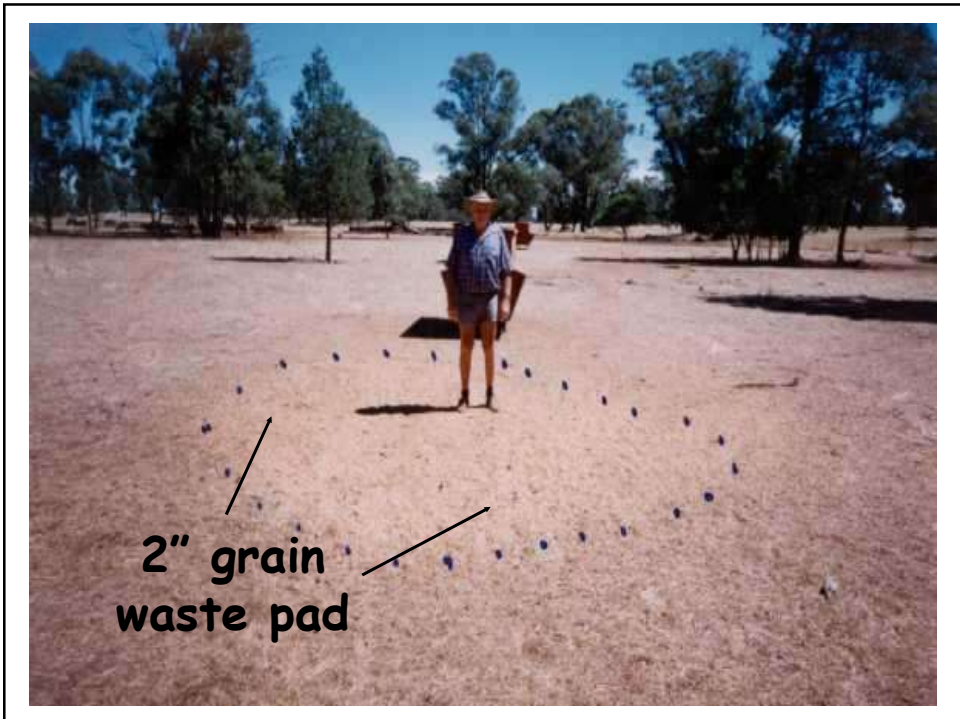
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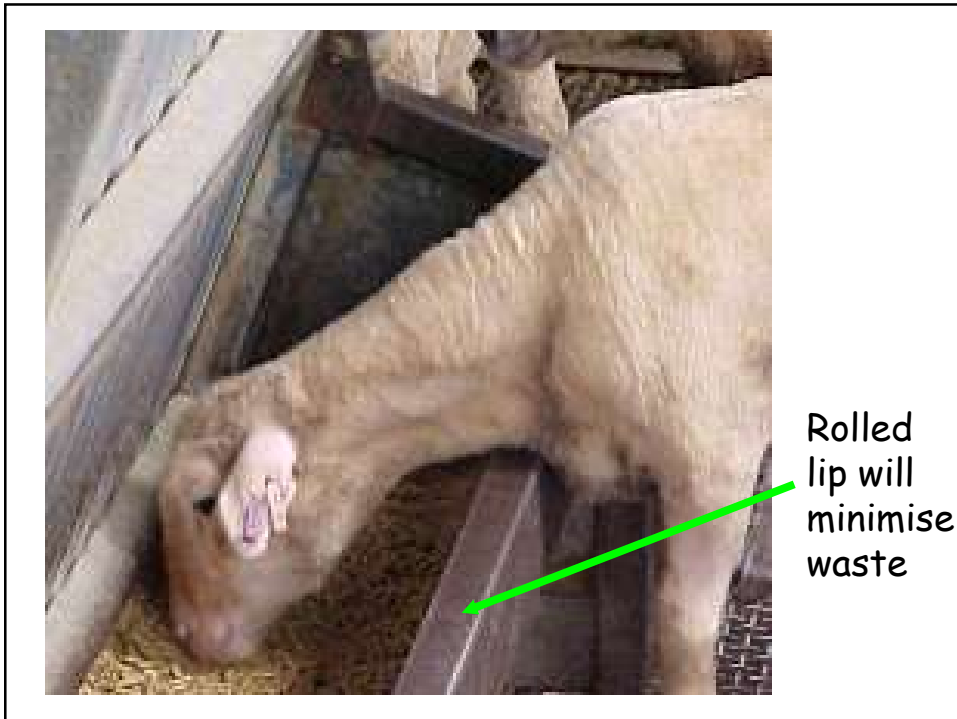
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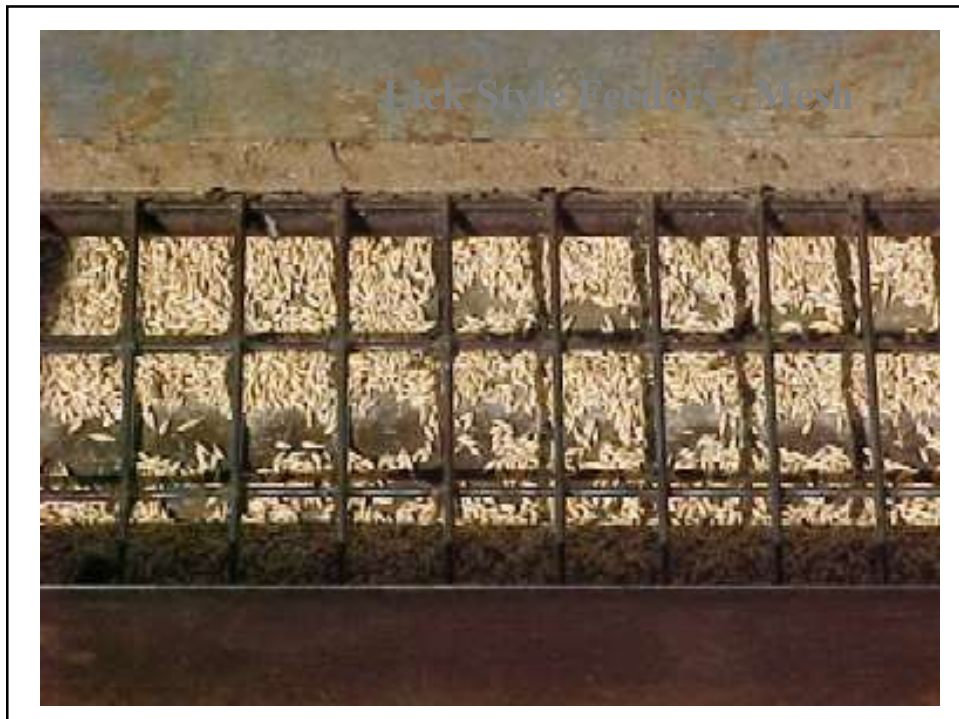
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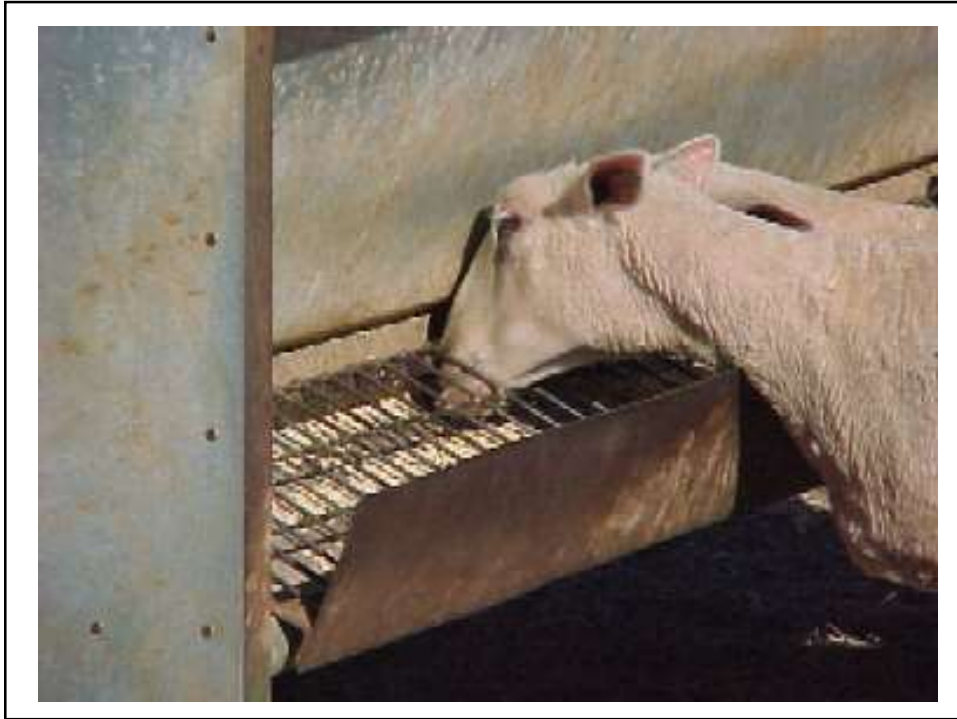
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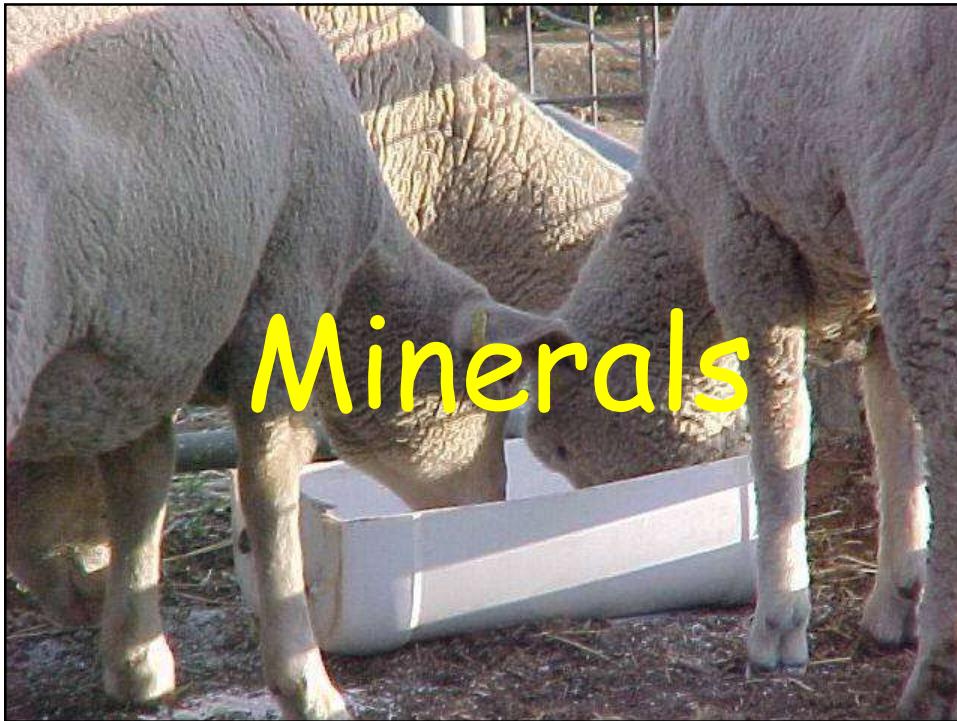
Feeders / Troughs

- Lift troughs (45-55cm)
- Keep clean and dry
- Position up slope and throughout site
- Block off access under feeders, particularly if feeding during lambing

108



109



110



111



112



113



114

Minerals

Cattle and sheep require many minerals - most are needed in only small amounts

Of the major minerals Ca, Na, P and Mg are most important

Mineral analysis of ration/diet components can help to identify potential deficiencies and/or interactions

115

Grains

	Barley	Corn	Oats	Sorghum	Triticale	Wheat	Brewers	DDG's
Dry matter	87.1	87.2	87.9	89.8	87.1	87	24.9	9.1
ME	12.4	13.5	12.2	13.4	12.9	13.1	10	12.5
Crude protein	11.8	9.7	11	10.7	11.7	12.6	25.9	37
Crude fibre	5.2	2.6	13.9	3.1	2.7	2.6	16.4	8
NDF	21.7					13.9	49.6	34
ADF	6.4					3.6	20.8	14.5
Lignin	1.1					1.1	5.7	4.5
Ether extract	2					1.7	7	5
Ash	2.6					1.8	4.1	6
Starch	59.7					69.1	5.7	4.2
Total sugars	2.8	3.7	1.6	0.8	3.7	3.2	1	3
Calcium	0.8	0.7	1.1	0.3	0.7	0.7	3	2.1
Phosphorus	3.9	3.4	3.6	3.8	3.9	3.6	5.8	9.1
Potassium	5.7	4.3	4.9	4.6	5.8	4.6	1.6	10.9
Sodium	0.1	0.1	0.1	0.2	0.1	0	0.3	4.9
Magnesium	1.3	1.4	1	1.7	1.2	1.2	2.3	3.7
K/(Ca+Mg)	2.7	2.3	2.3	2.3	3.1	2.4	0.3	1.9
K/Na	57	43	49	23	58	38	5	2

116

Pulses

	Chickpea	Cowpeas	Faba Beans	Lupin (Ang)	Lupin (Alb)	Mung Bean	Navy Bean
ME	13.3	13.4	12.8	13.2	13.2	13.2	11.7
Crude protein	22.1	24.9	29	33.8	43	25.8	24.8
Crude fibre	10.5	5.8	9.1	16.1	16.3	6.3	5.2
NDF	22.8					4	15.6
ADF	13.8					1	8.5
Ether extract	5					4	1.9
Starch	35.6					9	47
Total sugars	3.6	4.6	3.6	5.8	5.1		4.9
Ca	1.7	1.2	1.5	2.7	2.9	1.6	2.5
P	3.9	4	5.5	3.5	9.2	4.5	4.9
K/(Ca+Mg)	3.1	4.3	3.5	2.0	1.9	2.5	3.6
K/Na	59	150	115	18.5	18.5	18.5	169

117

Processed Meals

	Copra Meal	CSM	CM	SFM	Soybean Meal
ME	13	13.2	11.7	9.1	14.7
CP %	23.5	45	39	32.4	49.3
CF %	16.8	10.6	12.8	27.9	4.9
NDF	56.4			45	11.1
ADF	30.7			32	5.9
Lignin	8			10.7	0.5
EE	2.8			2.2	7.7
Ash	7			7.1	6.8
Sugars	11.4	4.8	18.5	6.1	9.3
Ca	0.7	2	7.4	4.4	4.6
P	6.5	12.4	11.6	11.6	7.2
K	22.8	16.6	13.7	16.9	21
Na	0.6	0.3	0.5	0.1	0.2
K/(Ca+Mg)	5.7	2.0	1.1	1.7	2.7
K/Na	38	55	27	169	105

118

Pastures

	Barley pasture	Oaten pasture	Wheat pasture	Lucerne	Sub Clovers	Sorghum pasture
ME	9.2	9.3	9.6	9.4	12.6	8.8
Crude protein	11	10.5	11	20.6	18.7	8.2
Crude fibre	28.1	30.2	28	26.7	22.1	33.6
NDF	57.6				27.2	57.9
ADF	32.7				30	35
Lignin	2.4				7.6	3.3
Ether extract	3.8				4.4	1.9
Ash	11.5				11.1	9.1
Calcium	4.9	3.8	3.8	19	14	4.1
Phosphorus	1.7	2.2	2.6	2.5	4	2
Potassium	14	22.2	11.2	22	26	19.3
Sodium	0.9	1.2	0.1	0.5	2.4	2.5
Magnesium	2.4	1.3	1.2	2.8	7	2.2
K/(Ca+Mg)	1.9	4.4	2.2	1.0	1.2	3.1
K/Na	16	19	112	44	3.7	7.7

119

My thoughts:

Loose lick year-round

- 2/2/1 Lime/Salt/Causmag
- 2/2/1/1 Lime/Salt/Causmag/Gypsum
- 1/1 Dolomite/Salt
- 1/1 Acid Buf/Salt
- 2/1/1 Acid Buf/Salt/Gypsum

Lime (Ca); Salt (Na); Acid Buf/Dolomite (Ca and Mg);
Causmag (Mg); Gypsum (Ca and S)

120



121

Fibre

- reduces the rate of gut flow
- diverts P from urine to manure improving Ca:P balance in urine (reducing bladder stone risk)
- Increases B¹² absorption (needed for energy)
- Provides additional Vitamin D
- Improves Mg availability & absorption
- Increases milk fat

If 40% + are 'cud chewing' fibre level is ok

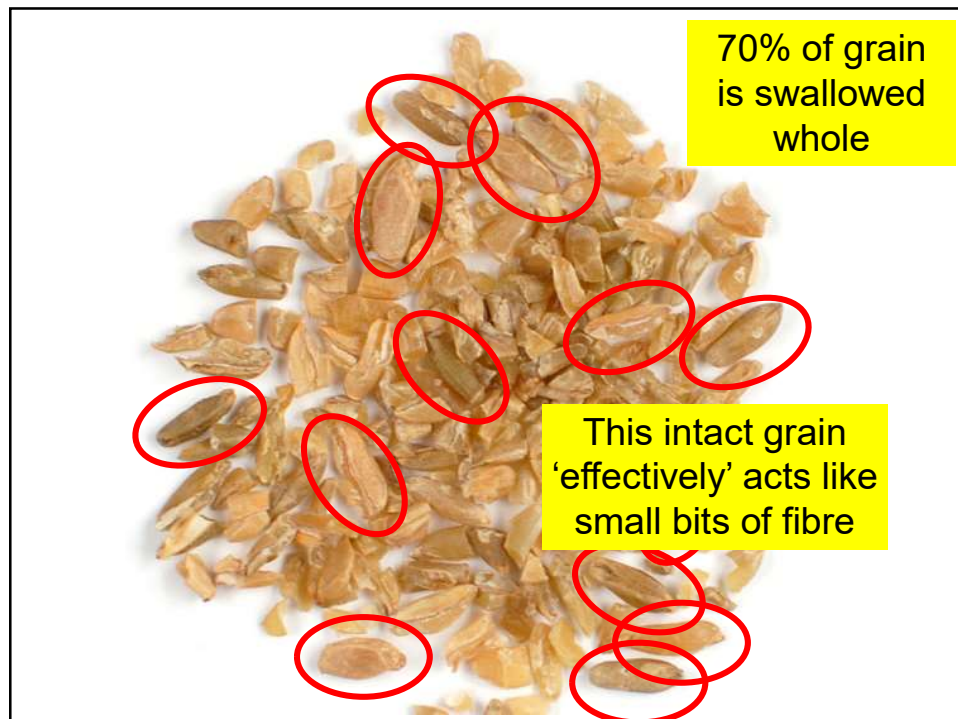
122

Inadequate fibre will lead to:

- rapid gut flow,
- a drop in rumen motility,
- changes to microbe number and percentages,
- a reduction in rumen efficiency
- the likelihood of grain poisoning

but we can feed grain alone

123



124

Chewing

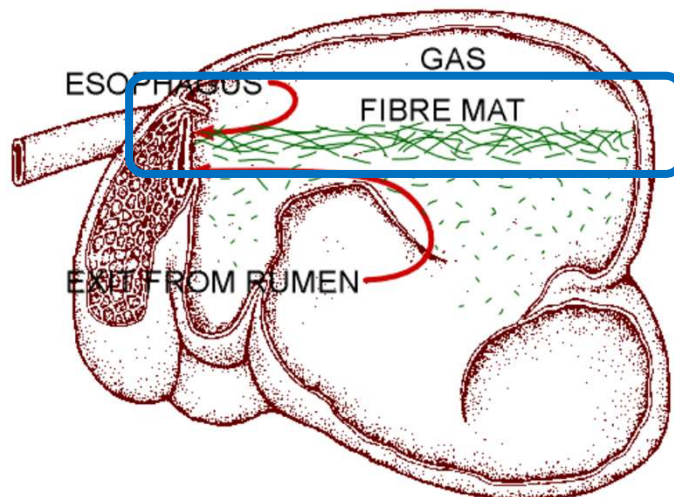
- breaks down large fibre particles
- promotes the production of saliva
- Saliva washes feed particles through the rumen and “buffers”

Physical “effective” fibre

- provides a ‘tickle factor’ which stimulates rumen contractions

125

Ruminants need 10+% ‘*effective*’ fibre (aim for a minimum of 10% for sheep; 20% for cattle)



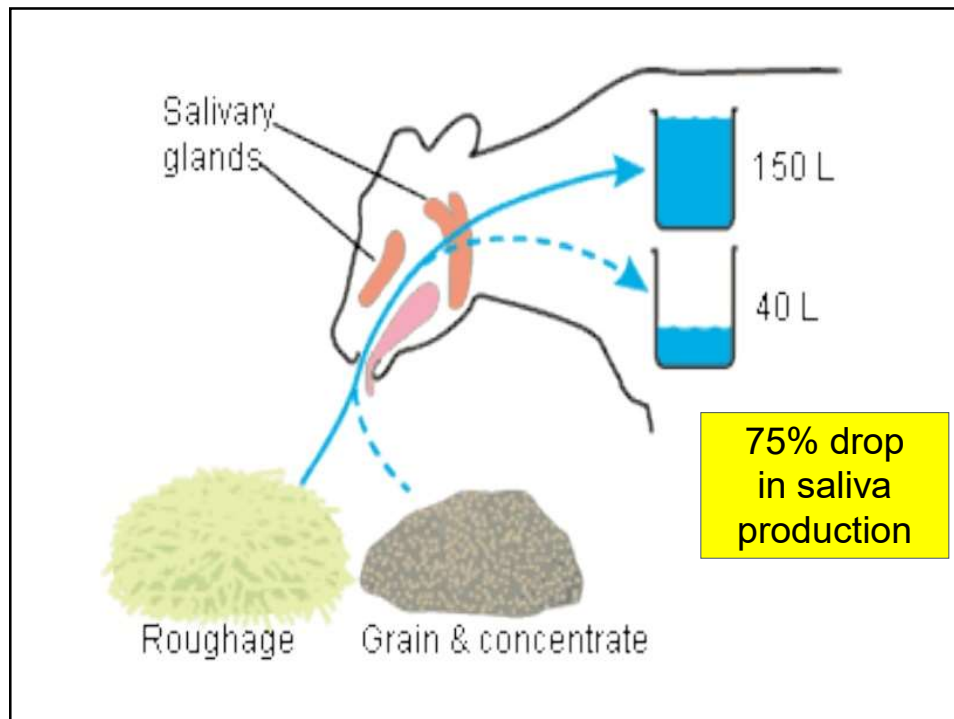
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This floating mat

- sorts particles with long particles near the top of the mat regurgitated for cud chewing.
- stabilizes rumen fermentation by
 - trapping fine particles,
 - slowing their rate of breakdown
 - minimizes the risk of a sharp drop in rumen pH

(a rumen pH below 5.7 dramatically reduces dry matter intake. Low pH for extended periods can lead to chronic acidosis)

127



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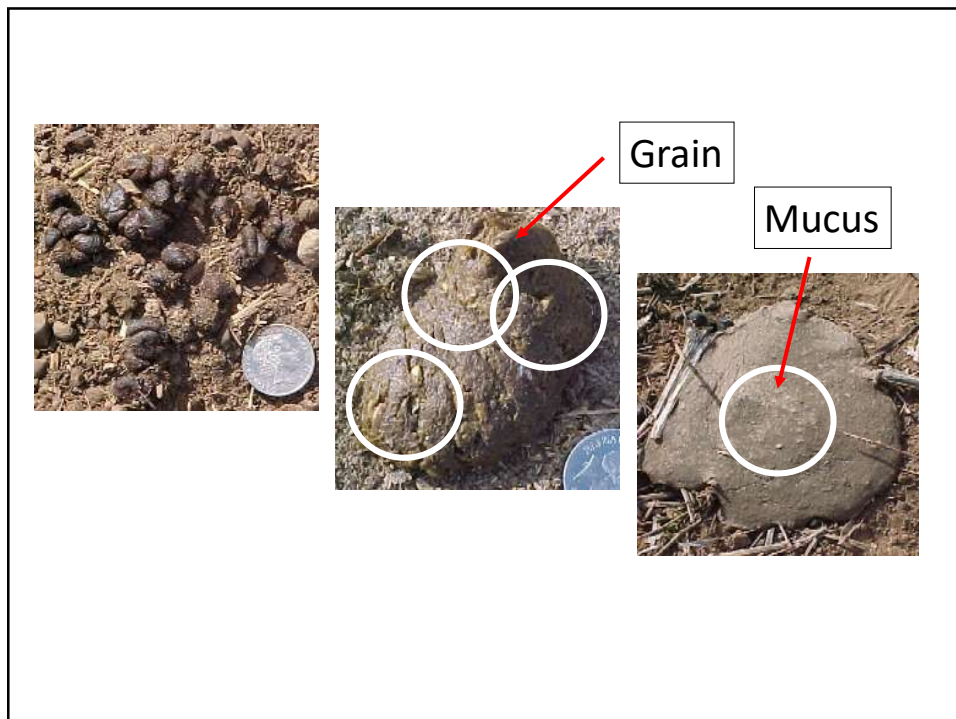
Fibre

Monitor manure to check if fibre and rumen health ok

The 3 "C's"

- Colour
- Consistency and
- Content

129



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136



Lambs feed
from under
bale.

Issues with
dust, grass
seeds,
waste etc

137



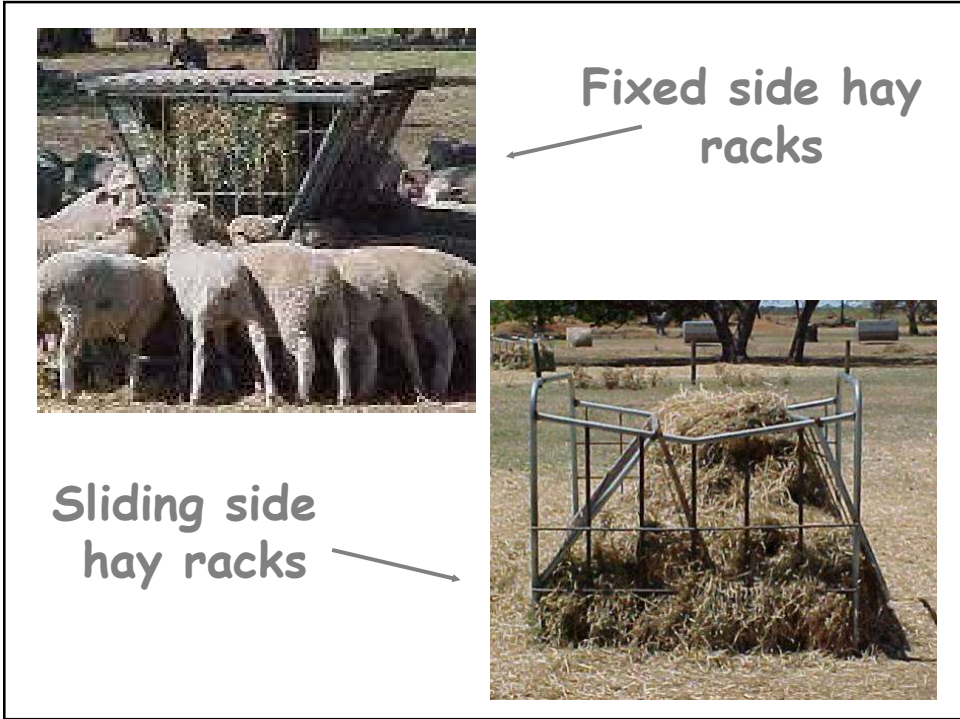
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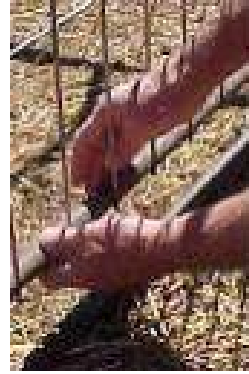
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Collapsible
sliding gate
hay rack



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Water

- A confinement system needs a reliable supply of good quality water
- Troughs with flow rates of at least 10 - 15 litres/head/hour are recommended
- A minimum of 2 - 3 days stored water supply is recommended

151

Water

Sheep 30 cm plus 1.5 cm per sheep
300 sheep = 30 cm + (300 x 1.5 cm)
= 4.8 m lineal trough space

Cattle 30 mm/head for 10% of stock (normal weather conditions)
75 mm/head during hot conditions.
100 cattle = 30 mm x 100
= 3.0m linear trough space during normal conditions
= 7.5 m during hot conditions

152

Water

- Rectangular troughs are recommended
- Consider using exclusion bars or fence lines along the length of water troughs to minimize damage and soiling from mud or manure
- Ensure float valves, supply and drainage pipes are well protected.
- Provide a robust apron around all watering points

153

Water

- Consider having multiple watering points or troughs within your confinement area.
- Ensure water is removed from containment areas during trough cleaning
- Maximize the distance between feeding areas and water troughs.
- Ensure all water pipes are buried to reduce water temperature within supply lines.

154

Water

- The optimum temperature of drinking water for sheep and cattle is between 16 - 18 °C.
- Shaded water troughs
 - are consistently cooler (by 6 °C or more),
 - have lower rates (up to 36%) of evaporative loss and
 - will help with heat loss.

155



156

Water

- Factors affecting water intake include:
 - **Water Quality** (salinity, acidity, contaminants)
 - **Environmental** (temperature, humidity, feed quality, water temperature)
 - **Animal factors** (age, stage of production, body condition, breed or cross)

157

Stock type	Consumption per head per day (L)
Weaner sheep	2-4
Adult dry sheep	2-6
Ewes with lambs	4-10
Young cattle	25-50
Dry cattle (400kg)	35-80
Lactating cows	40-100

158

158

Water Quality and Quantity

Salinity - < 7000 ppm

pH - 6.5 to 8.5 best
- too acidic or alkaline may lead to digestive upsets, reduced intakes and production loss

Pollutants - dust, feed, manure, algae etc

Temperature - consider shade

159

Water Quality and Quantity

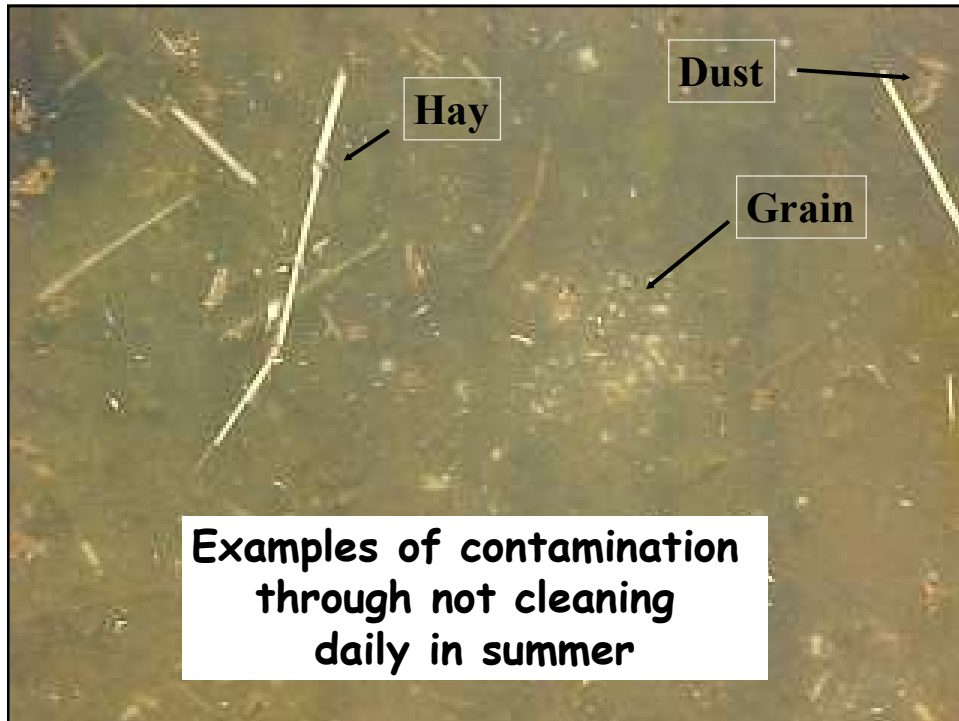
Raise troughs ~30cm

Position as far away from feed as practical

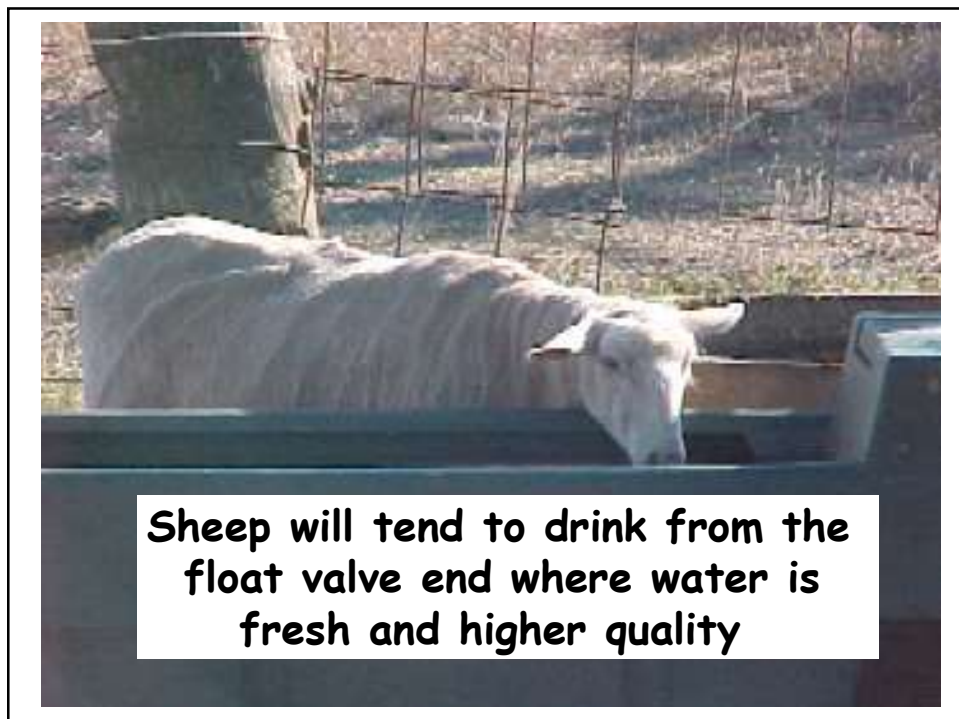
Correct if quality a problem (pH, salt)

Clean regularly

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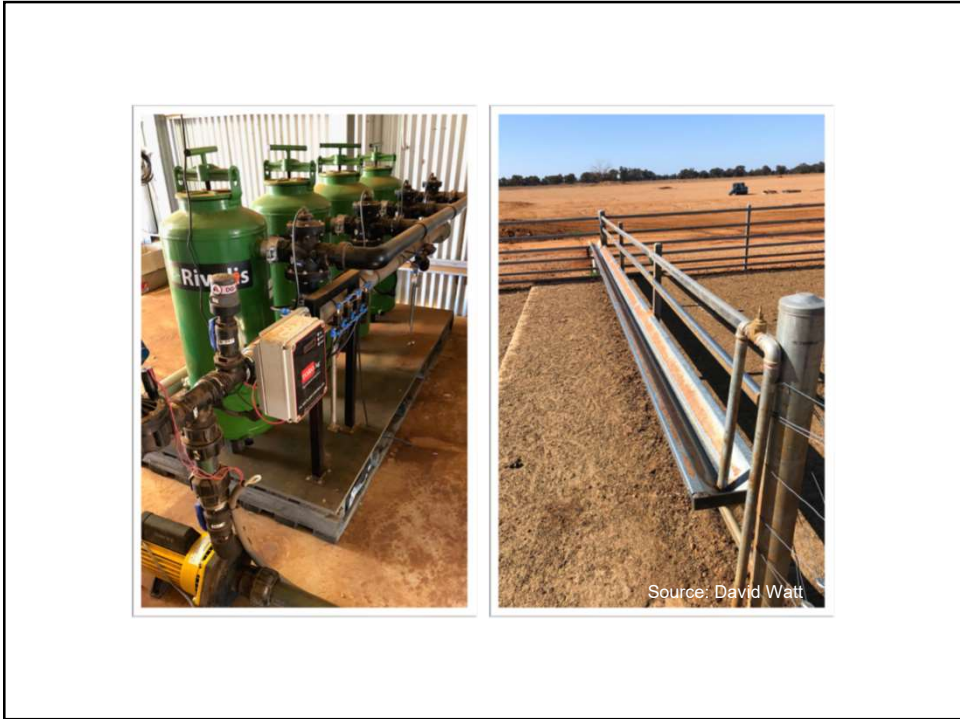
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Shade - they'll use it
BUT
Do they need it?

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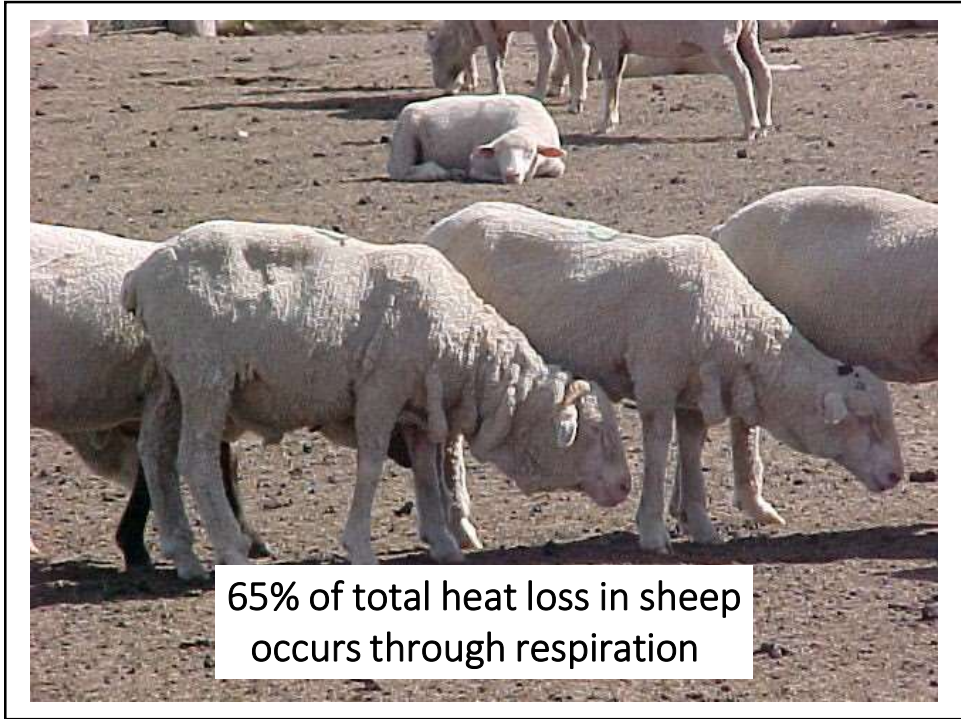
Shade

Grazing trials (sheep) comparing shade versus no-shade have shown no significant change in

- Grazing time
- Rumination time
- Time spent drinking
- Body temperature

Johnson & Strack (1992)
Max 31-37°C,
Min 12-21°C,
Rel Humidity 13-28%

178



179



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Sheep will minimise heat load by reducing reflective ground heat

181



Heat stress will lead to production loss

182



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185

Protecting Trees

Physical barriers (mesh/wire)

Chemicals:

- D-Ter (ammonium sulphate spray)
- Treepel (commercial egg-based powder)
- Eggs/water/acrylic paint
- Thiram fungicide and acrylic paint
- Mutton fat and kerosene (10:1)
- Faeces mixture
- Chilli or dog urine mixtures

186



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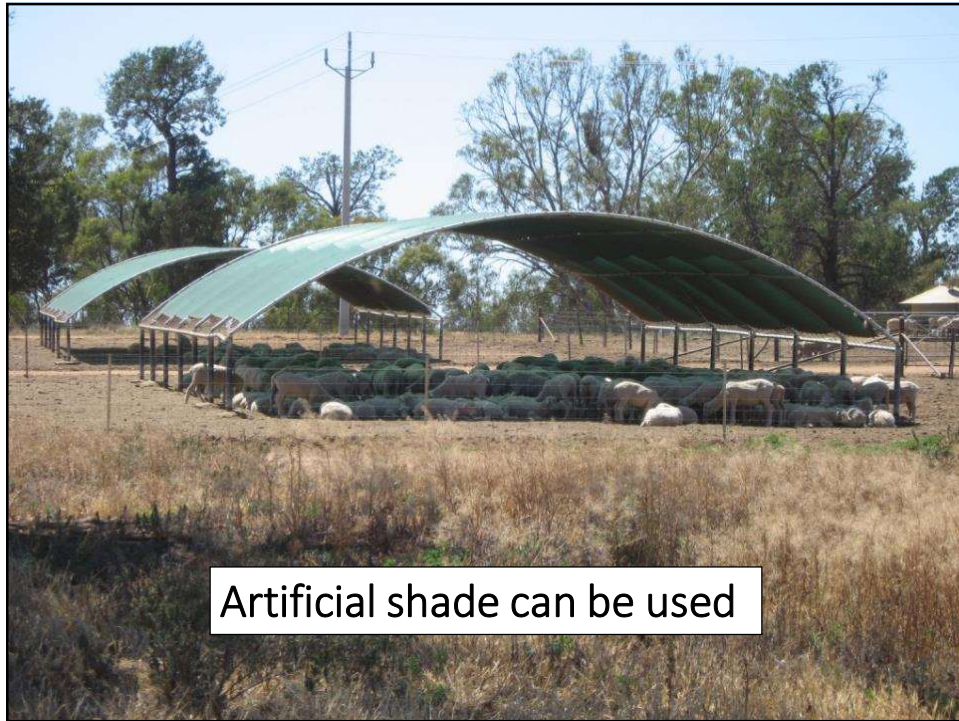
Fence off entire tree base – will still provide access to shade

191



Nutrients may however eventually kill trees on down slope of feedlot

192



Artificial shade can be used

193



194



195



196

Social Stress

Goat trial – ‘enriched’ vs ‘normal’ feedlot
under 2 stocking rates (6 and 11 m²/hd)

- **33%** drop in aggressive behaviour at feed trough at lower densities
- **36%** fewer non-feeders
- **83%** increase in daily gain (g/h/d)

Flint and Murray (2001)

197

Social Stress

Lamb – ‘enriched’ vs ‘normal’ feedlot

“Enriched”

- greater ADG’s,
- heavier carcasses,
- higher dressing percentages and lower pH

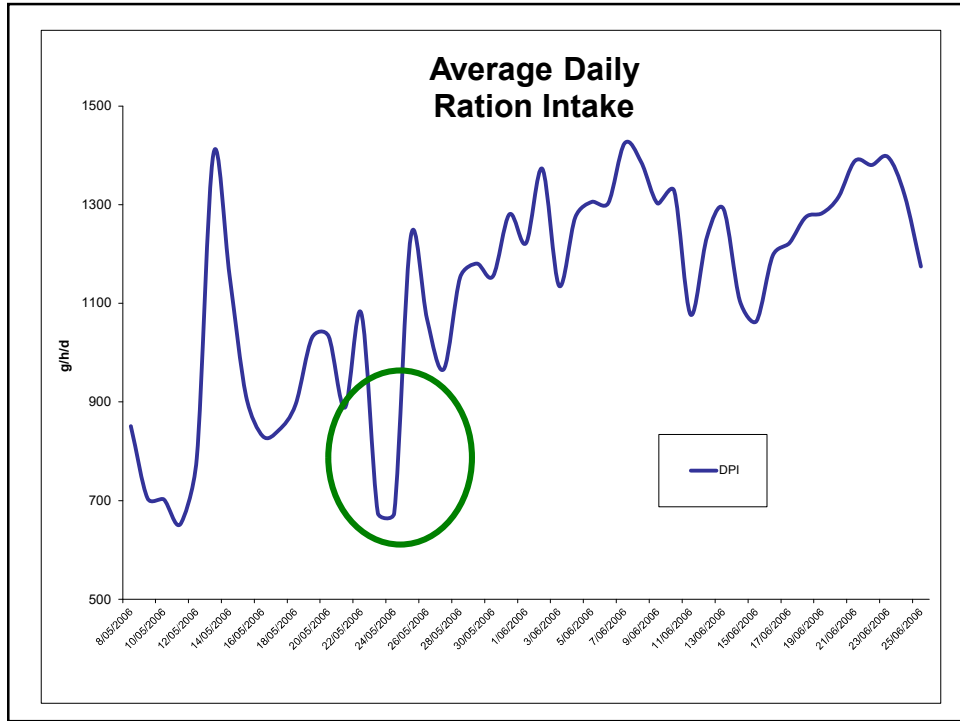
- a wooden platform with ramps giving access to a concentrate hopper,
- straw as bedding and forage &
- a further ramp for play

“Normal”

- greater stress,
- mobilized more body reserves and had
- lower levels of immunity

Lorena et al (2014)

198



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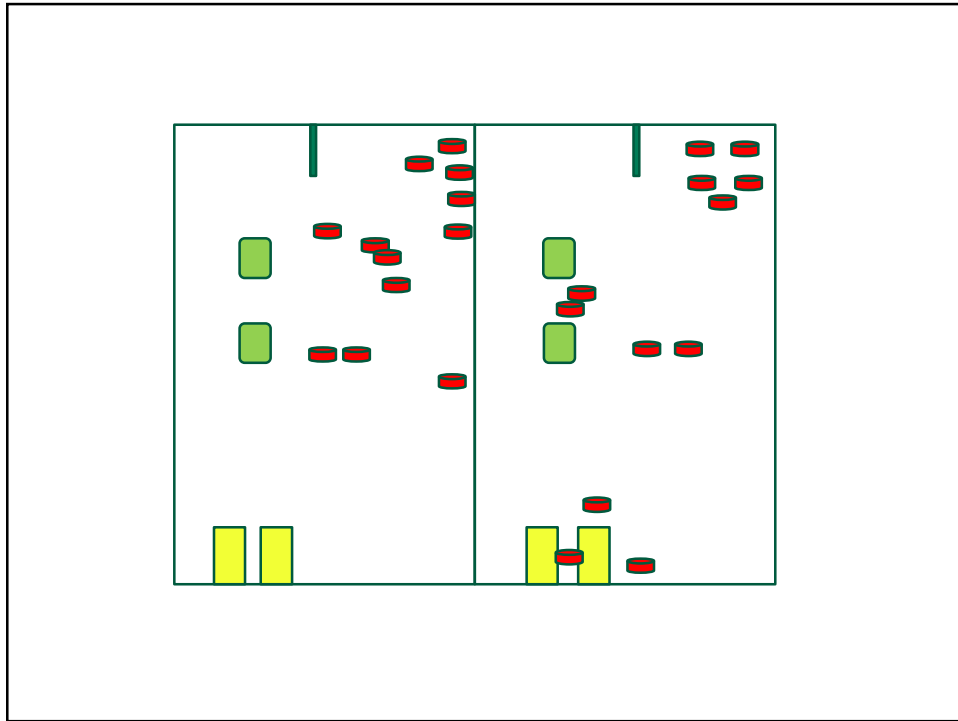
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In Confinement and upon release

Supplement(s):

- **Grain** (energy and fibre)
- **Bypass protein**
- **Bentonite** (reduces protozoa numbers; binds, protects and releases amino acids in small intestine; slows gut passage improving nutrient use and reducing risk of scouring; may increase wool growth by up to 13%)
- **Cobalt or Vitamin B₁₂** (essential for conversion of acids into glucose; for wool production and the metabolism of methionine)
- **Provide additional fibre** (Vitamin B₁₂ absorption is enhanced by slow gut flow; provides a form of 'effective' fibre/the 'scratch' factor)

204

In Confinement and upon release

Supplement(s):

- Magnesium, Calcium and Salt

- For Mg = Causmag, dolomite, Acid Buf,
- For Ca = Ag lime, Acid Buf
- For Na = Salt, Sodium Bicarbonate

Control worm burdens (damage to rumen or small intestine inhibits B12 absorption)

205



206



207



208



209



210

Urea

- NPN converted to ammonia and used to produce microbial protein (significant protein source for lamb)
- need adequate energy in ration, may need to supplement with K and S **dangerous**

Bentonite

- a clay, swells to 6-7 times size in rumen slowing gut flow
- binds acid ions, reduces protozoa (consume gut microbes)

Bicarb of Soda

- naturally produced by lamb when chewing
- buffers against acid production

Salt

- a sodium supplement, increases water/ration intakes



211

Molasses/Vegetable Oils

- energy source, improves palatability and reduces dust.
- Sugars yield less microbial protein but can increase the extent of ruminal fermentation

Limestone/Dolomite

- Ca supplement, some buffering action in SI, Mg (dolomite)

Acid Buf

- Seaweed extract with 4 times buffering ability of bicarb and buffers for longer period within the rumen
- Releases Ca and Mg, can replace CaCO_3 , bicarb and causmag

Electrolytes

- Usually glucose, Na, K, bicarb, sometimes Mg



212

Acid Salts (NH_4Cl , CaCl_2 , $(\text{NH}_4)_2\text{SO}_4$ etc)

- Mobilises Ca from small intestine, acidifies urine, may help with prevention of bladder stones but **bitter**

Ionophores (eg: Bovatec)

- A coccidiostat that depresses or inhibits the growth of high acid producing microbes and protozoa
- May improve feed conversion efficiency but **may reduce intake**
- 25-70g per tonne of feed so usually as a pre-mix

Virginiamycin (Eskalin)

- An antibiotic, need veterinary approval (S4)
- Prevents multiplication of lactic acid producing bugs

213

Thankyou



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214