

PASTURE MANAGEMENT CHECKLIST FOR THE NORTHERN TABLELANDS OF NSW



Lewis Kahn and Judi Earl
Agricultural Information and Monitoring Services



Low and ideal values for the 12 key pasture checklist points

	Low (<i>less than</i>)	Ideal
Herbage mass (kg DM/ha) - sheep - cattle	800 1,200	1,200 – 3,000 2,000 – 4,000
Herbage mass - % edible	80%	100%
Percentage green <i>spring, summer & autumn</i>	60%	more than 75%
Ground cover	95%	100%
Broadleaf plant component	5%	10 – 15%
Legume component <i>spring to early summer</i>	10%	15 – 25%
Annual grass component <i>autumn, winter & spring</i>	5%	10 – 15%
Perennial grass component	30%	60 – 80%
Diversity of perennial grasses	3	more than 7
Pasture growth rate - spring - summer - autumn - winter	15 15 10 0	45 50 25 10
Water use efficiency	6	more than 10
Pasture utilisation rate - spring - summer - autumn - winter	35 – 40% 15 – 20% 25 – 30% 100 – 110%	55 – 60% 35 – 40% 45 – 50% 140 – 150%

Pasture growth rate

Step 1: Calculate average stocking rate (DSE/ha) for the period between two estimates of herbage mass (SR)

Note: DSE tables provided at the end of this checklist

Step 2: Calculate the number of days in that period (T)

Step 3: Estimate herbage mass (kg DM/ha) at start of period (HM1)

Step 4: Estimate herbage mass (kg DM/ha) at end of period (HM2)

Calculation is:
$$\frac{(SR \times T) + (HM2 - HM1)}{T} = \dots\dots\dots \text{kg DM/ha/day}$$

See page 10 for further details

Water use efficiency

Step 1: Calculate pasture growth over the period (PG)

Step 2: Record rainfall (mm) over the period used to calculate pasture growth (R)

Calculation is:
$$\frac{PG}{R} = \dots\dots\dots \text{kg DM/ha/mm}$$

See page 11 for further details

Pasture utilisation rate

Step 1: Calculate pasture growth rate over the period (PGR)

Step 2: Calculate average stocking rate over the same period (SR)

Calculation is:
$$\frac{SR}{PGR} \times 100 = \dots\dots\dots \%$$

See page 12 for further details

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Disclaimer

This publication is intended to provide general information on pasture assessment and management. The authors acknowledge that pasture types may vary and will not be responsible for any loss caused by reliance on this publication.

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This document was prepared by Dr Lewis Kahn and Dr Judi Earl of Agricultural Information & Monitoring Services.

Tel. 0267711273

0267792286

Email: lewiskahn@bigpond.com judiearl@auzzie.net

The purpose of this pasture management checklist

The aim of this checklist is to help you to improve the profitability and sustainability of your grazing enterprise by pasture assessment and adaptive pasture management.

Improved pasture assessment will allow you to improve management and optimise pasture performance. At the same time these skills will allow you to determine appropriate stocking rates for your pastures throughout the year.

The pasture management checklist

There are 12 key points to assessing the condition of your pastures and these are:

1. Herbage mass
2. Herbage mass – *percentage edible*
3. Percentage green
4. Ground cover
5. Broadleaved plants component of herbage mass
6. Legume component of herbage mass
7. Annual grass component of herbage mass
8. Perennial grass component of herbage mass
9. Diversity of perennial grass species
10. Pasture growth rate
11. Water use efficiency
12. Pasture utilisation rate

Each key point is described in detail and examples of how to conduct each assessment are provided.

Recording sheets are provided in this checklist for you to record the outcome of your pasture assessment and the grazing details for a paddock. We recommend that each recording sheet be used to assess pasture condition on 4 occasions in the same paddock over the year.

One CD containing an EXCEL® workbook is provided to calculate stocking rate, pasture growth rate, water use efficiency, pasture utilisation rate and feed budgets. Make sure to write these results on the recording sheets in this checklist.

Conducting the pasture management checklist

- Assessment should be conducted at the start of each season for a selection of at least 3 paddocks (which represent different pasture types) on each farm
 - The recording sheets may be used more frequently if required – for example prior to and after each grazing event
- Within each paddock choose up to 3 locations which represent the variation in the paddock
 - Variation may include factors such as; soil type, pasture species, aspect, tree cover, etc
 - Small paddocks with little variation may only require 1 location
- At each location conduct the pasture checklist assessment over an area of about 10 m x 10 m
- Record the assessment in the recording sheets provided at the rear of this booklet
 - Enter in the recording sheets
 - Paddock name
 - Grazable area
 - Date of pasture assessment
 - Results of the 12 key pasture checklist points
 - There are 4 boxes within each checklist point in the recording sheet, which allow for up to 3 locations in a paddock plus the paddock average
 - Checklist points that are low or ideal
 - Grazing details

Thinking this is going to be all too hard?

The first few occasions of using the checklist may take some time but you will get quicker with practice. Eventually you will reach the point where the checklist will be completed in about 10-20 mins per paddock.

It will be worth the effort!

Lewis Kahn & Judi Earl

(A) Herbage mass

- Quantity of pasture in the paddock
 - Measured as kg dry matter/ha (kg DM/ha)
 - Controls feed intake of animals and pasture regrowth rate
 - Used to calculate feed budgets and set appropriate stocking rates
- Low: less than 800 kg DM/ha (sheep); 1,200 kg DM/ha (cattle)
- Feed intake and pasture growth rate will be greatly restricted and desirable species may not persist
- Too much: more than 3,000 kg DM/ha (sheep); 4,000 kg DM/ha (cattle)
- No advantage for feed intake, pasture quality and growth rates decline, shading may reduce the number of plants
- Ideal: 1,200 – 3,000 kg DM/ha (sheep); 2,000 – 4,000 kg DM/ha (cattle)
- Feed intake, diet selection and pasture growth rates optimised

To calculate:

Step 1: Measure pasture height (cm) from the ground to the top of the bulk of leaves; do not extend leaves and do not measure to the top of seedheads. See pasture height photo.

Step 2: Estimate pasture density in terms of kg DM/ha for every centimetre of pasture height

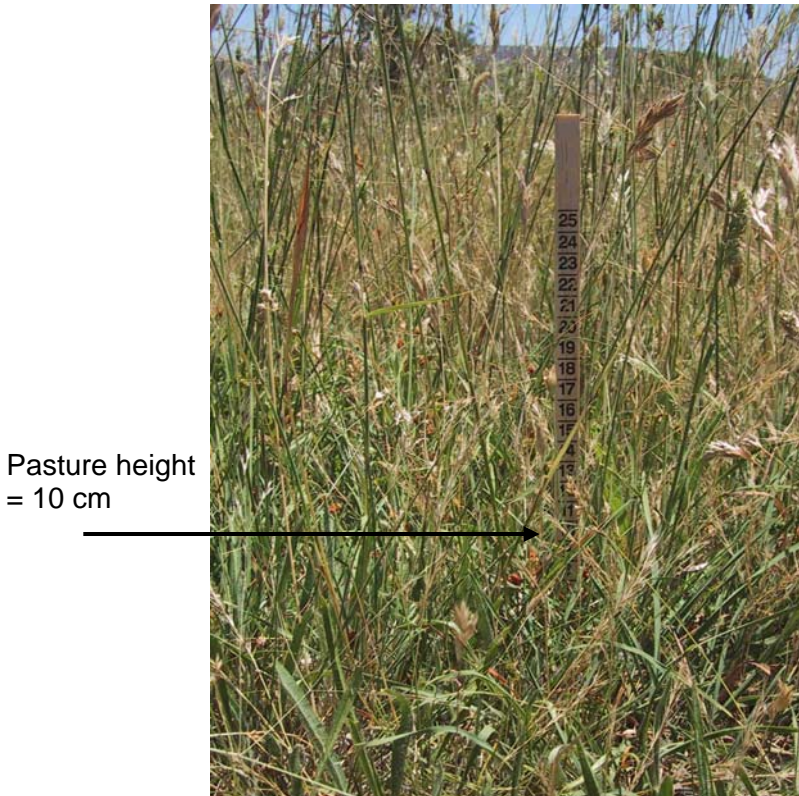
Table: Guide to the estimation of pasture density (kg DM/ha/cm)

Pasture density (kg DM/ha/cm)	Description
150	Ground readily seen through sparse pasture
200	Ground seen through sparse pasture (see ground cover photo)
250	Ground occasionally seen through average pasture
300	Ground not visible through average pasture
350	Good pasture density (see ground cover photo)
400	Dense pasture
450	Very dense pasture

Step 3: Multiply pasture height x pasture density

(eg. 10 cm x 250 kg DM/ha/cm = 2,500 kg DM/ha herbage mass)

Pasture height



(B) Herbage mass – *percentage edible*

- Percentage of herbage mass that would be eaten by livestock
- Measured as percent of herbage mass (%)
- Your estimate may change with season. For example, *Poa tussock* may be considered not edible during spring, when other green pasture is present but at the end of winter may be considered as a valuable source of roughage
 - Low: less than 80%
 - Marginal: 80 – 99%
 - Ideal: 100%

(C) Percentage green

- Percentage of herbage mass that is green, as opposed to dead
- Measured as percent of herbage mass (%)
- When estimating percentage green, ensure to look for and include in your estimate, any attached dead plant material at the bottom of the pasture. This does not include detached litter
- During spring, summer and autumn;
 - Low: less than 60%
 - Marginal: 60 – 75%
 - Ideal: greater than 75%

(D) Ground cover

- Area of the soil surface covered by plant material, litter or dung (ie. not bareground)
- Measured as percent of area (%)
- Reduces rainfall run-off and increases water infiltration
- Allows you to maximise the conversion of rainfall to herbage mass
 - Low: less than 95%
 - Marginal: 95 – 99%
 - Ideal: 100%
- See ground cover photos on page 7 for examples of 25, 50, 75 and 100% ground cover

(E) Broadleaved plant component of herbage mass

- Broadleaved non-grass species in the pasture (ie. plantain or flatweed)
- Measured as percent of herbage mass (%)
- Enhance the quality of the herbage (ie. digestibility, crude protein and mineral content). Have a tap root system which aids soil structure and nutrient cycling. Improves the diversity of pastures which buffers against seasonal changes
 - Low: less than 5%
 - Marginal: 5 – 10%
 - Ideal: 10 – 15%
 - Too much: greater than 15%

Ground cover



25% ground cover



50% ground cover



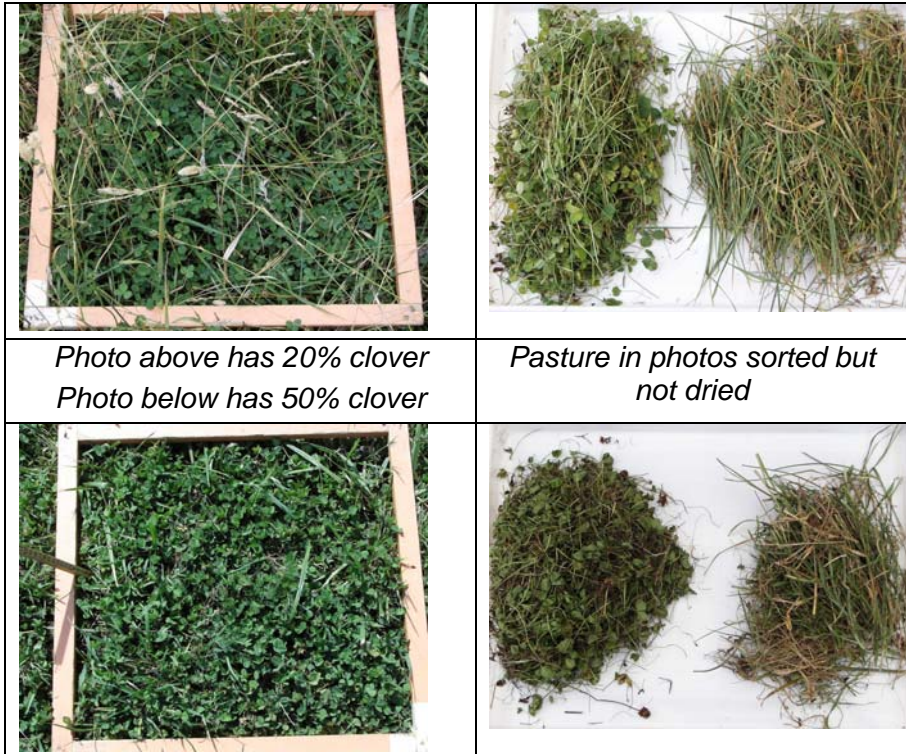
75% ground cover
Pasture density = 200 kg
DM/ha/cm



100% ground cover
Pasture density = 350 kg
DM/ha/cm

(F) Legume component of herbage mass

- Clovers, medics, lucerne, lotus and native twinning legumes
- Measured as percent of herbage mass (%)
- Enhance the quality of the herbage (ie. digestibility, crude protein and mineral content). In association with certain bacteria, have the capacity to transform nitrogen from the atmosphere into plant material which will eventually improve soil nitrogen.
- During spring to early summer, and year-round for perennial legumes such as lucerne;
 - Low: less than 10%
 - Marginal: 10 – 15%
 - Ideal: 15 – 25%
 - Too much: greater than 25%
 - If allowed to exceed this value there is a risk of creating bare ground at the next dry spell when legumes disappear.



(G) Annual grass component of herbage mass

- Percentage of herbage mass provided by annual grass species
 - Annual grass species are easily pulled out of the ground
- Measured as percent of herbage mass (%)
- Provides seasonal feed, most evident during late winter and spring
- During autumn, winter and spring
 - Low: less than 5%
 - Marginal: 5 – 10%
 - Ideal: 10 – 15%
 - Too much: greater than 15%

(H) Perennial grass component of herbage mass

- Percentage of herbage mass provided by perennial grass species
 - Perennial grass species are difficult to pull out of the ground; annual grass species pull-out easily
- Measured as percent of herbage mass (%)
- Provides year-round stability to pasture and animal production
 - Low: less than 30%
 - Marginal: 30 – 60% and greater than 80%
 - Ideal: 60 – 80%
 - The ideal percentage does not exceed 80% because the presence of a range of annual grasses, broadleaved plants and legumes will be desirable

(I) Diversity of desirable perennial grass species

- The number of desirable perennial grass species in the pasture
- Provides year-round stability to pasture and animal production and ensures healthy pasture ecosystems
 - Stability is provided by the presence of perennial species with different growth cycles which maximise the conversion of sunlight into herbage
- Low: less than 3
- Marginal: 4 – 6
- Ideal: greater than 7

Estimate once per year at the start of summer or more often if desired

(J) Pasture growth rate

- Production of herbage mass over time
- Measured as kg dry matter/ha/day (kg DM/ha/day)
- Used in the feed budgeting process to set appropriate stocking rates

Table: Range of seasonal pasture growth rates (kg DM/ha/day)

Season	Low	Marginal	Ideal
Spring	15	25	45
Summer	15	30	50
Autumn	10	15	25
Winter	0	5	10

To calculate:

Step 1: Calculate average stocking rate for the period between two estimates of herbage mass (SR: 8 DSE/ha)

Note: DSE tables provided at the end of this checklist

Step 2: Calculate the number of days in that period (T: 90 days)

Step 3: Estimate herbage mass at start of period (HM1: 1,000 kg DM/ha)

Step 4: Estimate herbage mass at end of period (HM2: 3,000 kg DM/ha)

Calculation is:

$$\frac{(SR \times T) + (HM2 - HM1)}{T} = \dots\dots\text{kg DM/ha/day}$$

$$\frac{(8 \times 90) + (3,000 - 1,000)}{90} = 30 \text{ kg DM/ha/day}$$

NOTE

Average stocking rate refers to the average stocking rate for the whole period of days in the calculation. For example, if the stocking rate in the paddock was 8 DSE/ha for 90 days then the average stocking rate would be 8 DSE/ha. If there was 8 DSE/ha for 45 days and no stock for 45 days, the average stocking rate would be 4 DSE/ha. And so forth....

(K) Water use efficiency

- Herbage mass grown per millimetre (mm) of rainfall
- Measured as kg dry matter/ha/mm rainfall (kg DM/ha/mm)
 - Ideally calculated over a period of at least 3 months
- Indicates how effectively pastures convert rainfall to herbage mass
 - Low: less than 6 kg DM/ha/mm
 - Marginal: 6 – 10 kg DM/ha/mm
 - Ideal: greater than 10 kg DM/ha/mm

To calculate:

Step 1: Calculate pasture growth over the period (PG: 30 kg DM/ha/day x 90 days = 2,700 kg DM/ha/90 days) *see page 10 for details*

Step 2: Record rainfall over the period used to calculate pasture growth (R: 300 mm) *see NOTE below*

Calculation is:

$$\frac{PG}{R} = \dots\dots\text{kg DM/ha/mm}$$

$$\frac{2,700}{300} = 9 \text{ kg DM/ha/mm}$$

NOTE

When deciding the amount of rainfall that has fallen in the measurement period a few practical issues should be considered. These are:

1. All rainfall events in the week prior to the start of the period SHOULD be included because this rain will aid pasture growth during the measurement period.
2. All rainfall events in the last week of the measurement period should NOT be included because it is unlikely that these events will significantly affect pasture growth rate.
3. For example if the period was from 1st January – 1st April, include rainfall from 24th December – 24th March.

(L) Pasture utilisation rate

- The percentage of pasture growth eaten by the animal
- Measured as percent (%) of herbage mass grown during a defined period
- Pasture utilisation is best calculated over a period of at least 3 months. Utilisation may be greater than 100% over winter indicating that animals are consuming more than current pasture growth
- Low pasture utilisation will result in lower than optimal stocking rates, lower quality pastures and lead to accumulation of excessive litter
- Too much pasture utilisation will reduce pasture growth rate in the next season/s and the amount of herbage available for litter

Table: Range of seasonal pasture utilisation rates (%)

Season	Low	Marginal	Ideal
Spring	35 – 40	45 – 50	55 – 60
Summer	15 – 20	25 – 30	35 – 40
Autumn	25 – 30	35 – 40	45 – 50
Winter	100 – 110	120 – 130	140 – 150

Values are highly dependent on pasture growth rates

To calculate:

Step 1: Calculate pasture growth rate over the period (PGR: 30 kg DM/ha/day)

Step 2: Calculate average stocking rate over the period (SR: 8 DSE/ha)

Calculation is:

$$\frac{\text{SR}}{\text{PGR}} \times 100 = \dots\%$$

$$\frac{8}{30} \times 100 = 27\% \text{ pasture utilisation}$$

Further information

Agricultural Information & Monitoring Services

Postal: 625 Cluny Rd

Armidale

NSW, 2350

Tel. 0267711273

Email: lewiskahn@bigpond.com

73 Hardinge St

Guyra

NSW 2365

0267792286

judiearl@auzzie.net

Southern New England Landcare Ltd.

Postal: PO Box 75A

Armidale

NSW, 2350

Tel. 0267729123

Email: snelcc@bigpond.com

Granite Borders Landcare Committee

PO Box 400

Tenterfield NSW 2372

Phone: 6736 3500

Email: landcare@halenet.com.au

Glen Innes Natural Resources Advisory Committee

PO Box 660 (285 Grey St)

Glen Innes NSW 2370

Phone: 6732 3443

Email: glenrac@bigpond.net.au

Department of Primary Industries www.dpi.nsw.gov.au

Meat & Livestock Australia www.mla.com.au

Feed budgeting

- Is a process used to determine how many stock can be run on an area for a given period of time
 - Feed budgeting does not determine feed quality requirements of livestock which should be assessed separately
- Is a process to guard against over and under grazing
- Requires knowledge or estimates of:
 - Grazable area, which may be a paddock or a farm
 - Type of stock to be run during a nominated period
 - DSE rating of the type of stock based on their nutritional requirements and estimated growth rate (*provided at the end of this checklist*)
 - Herbage mass at the start of the period
 - Desired herbage mass at the end of the period
 - Consult herbage mass targets provided earlier in this checklist
 - Minimum herbage mass should only be reached at the very end of the non-growing period, if at all. If minimum herbage mass is reached this should not be less than 800 kg DM/ha for sheep and 1,200 kg DM/ha for cattle.
 - Grazing to below these minimum levels will limit the rate of pasture regrowth and likely result in inadequate ground cover
- Feed budgets should be conducted in Autumn and cover the intervening period till Spring. For example, areas to the west of the Tablelands should cover the period 1st March – 1st September and areas to the east of the Tablelands 1st April – 1st October. This feed budget will aid stocking decisions over a difficult time of year
- Feed budgeting is an important tool which can be used in conjunction with a grazing plan

Feed budgeting

Information required:

Farm area (ha)

Length of period (days)

Type of stock during period

DSE rating for stock type

Herbage mass at start of period

Desired herbage mass at end of period

Estimated pasture growth rate (PGR)

A	Farm area (ha)	
	Start of period (date)	
	End of period (date)	
T	Length of period (days)	
S	Type of stock	
D	DSE rating (DSE/stock unit)	
HM1	Start herbage mass (kg DM/ha)	
HM2	Desired end herbage mass (kg DM/ha)	
PGR	Pasture growth rate (kg DM/ha/d)	
1	Available feed (kg DM/ha/d)	
2	Number of stock units/ha	
3	Number of stock units	

$$1. \text{ Available feed} = \frac{(\text{HM1} - \text{HM2})}{\text{T}} + \text{PGR}$$

$$2. \text{ Number of stock units/ha} = \frac{\text{available feed}}{\text{DSE rating 'D'}}$$

$$3. \text{ Number of stock units} = (\text{number of stock units/ha} \times \text{paddock area 'A'})$$

Grazing details for monitor paddock

Livestock				Grazing			Supplement (kg/mob/week)	
Class	No.	Weight	DSE rating	Stock in	Stock out	Days	Type	Amount
<i>eg. Merino ewes (4 months pregnant)</i>	468	48 kg	1.1	1/3/07	10/3/07	9	sorghum	1000

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$$\text{Stocking rate} = \frac{\text{No livestock} \times \text{DSE rating}}{\text{Grazable area}} \times \frac{\text{Days grazed}}{\text{Days in period}}$$

Paddock name:

Grazable area (ha)	Date	Date	Date	Date
Herbage mass (kg DM/ha) A	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Herbage mass - % <i>edible</i> (%) B	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Percentage green (%) C	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Ground cover (%) D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Broadleaf plant component (% of herbage mass) E	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Legume component (% of herbage mass) F	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Annual grass component (% of herbage mass) G	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Perennial grass component (% of herbage mass) H	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Diversity of perennial grasses (number) I	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pasture growth rate (kg DM/ha/day) J				
Water use efficiency (kg DM/ha/mm) K				
Pasture utilisation rate (%) L				
What factors are low				
What factors are ideal				
Rainfall in period (mm) (see page 11)				
Stocking rate in period (DSE/ha)				

DSE rating for dry cattle

Weight of steer or dry heifer (kg)	Growth rate (kg/day)	DSE rating
200	0	3.5
250	0	4.5
300	0	5.0
350	0	6.0
400	0	7.0
200	0.5	6.0
250	0.5	7.0
300	0.5	7.5
350	0.5	8.5
400	0.5	9.5
200	1.0	8.5
250	1.0	9.5
300	1.0	10.0
350	1.0	11.0
400	1.0	12.0

DSE rating for cows

Weight of cow (kg)	Pregnancy/ lactation	DSE rating
400	dry	7.0
400	pregnant early	8.0
400	pregnant late	9.5
400	lactating early	14.0
400	lactating late	17.0
500	dry	9.0
500	pregnant early	10.0
500	pregnant late	11.5
500	lactating early	16.0
500	lactating late	19.0

DSE rating for dry sheep

Weight of sheep (kg)	Growth rate (g/day)	DSE rating
30	0	0.7
40	0	0.8
50	0	1.0
60	0	1.2
30	50	0.9
40	50	1.0
50	50	1.3
60	50	1.5
30	100	1.1
40	100	1.2
50	100	1.5
60	100	1.7

DSE rating for ewes

Weight of ewe (kg)	Pregnancy/ lactation	DSE rating
40	dry	0.8
40	pregnant - single	1.0
40	pregnant - twin	1.1
40	lactating – single	2.0
40	lactating – twin	2.6
50	dry	1.0
50	pregnant - single	1.1
50	pregnant - twin	1.2
50	lactating – single	2.2
50	lactating – twin	2.8
60	dry	1.2
60	pregnant - single	1.3
60	pregnant - twin	1.4
60	lactating – single	2.4
60	lactating – twin	3.0