

PASTURE MANAGEMENT CHECKLIST

FOR

THE SOUTH WEST REGION OF WA



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Low and ideal values for the 12 key pasture checklist points

	Low <i>(less than)</i>	Ideal
Herbage mass (kg DM/ha)		
- sheep	1,000	1,500 – 3,000
- cattle	1,500	2,000 – 4,000
Herbage mass - % edible	80%	100%
Percentage green <i>autumn, winter & spring</i>	60%	more than 75%
Ground cover	95%	100%
Broadleaf plant component	5%	10 – 15%
Legume component <i>autumn to spring</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		
- autumn	10	25
- winter	15	30
- spring	30	65
- summer	0	10
Water use efficiency	6	more than 10
Pasture utilisation rate		
- autumn	35 – 40%	55 – 60%
- winter	35 – 40%	55 – 60%
- spring	25 – 30%	35 – 40%
- summer	100%	140 – 150%

Note – the elements marked with the asterisk (*) are aspirational. Most pastures of the south-west region will be dominated by annual grasses and what you consider to be the ideal ratio of annual:perennial will be influenced by your starting point and your pasture management goals.

Calculations of Key indicators

Pasture growth rate

Step 1: Calculate the 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 the herbage mass (kg DM/ha) at start of period (HM1)

Step 4: Estimate the 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 8 for further details

Water use efficiency

Step 1: Calculate the 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 9 for further details

Pasture utilisation rate

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

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

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

See page 10 for further details

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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, optimise pasture performance and improve the health and resilience of your landscape. 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, seasonally, in the same paddock over the year.

An EXCEL[®] workbook is available at www.aimsag.com.au/software 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 square
- 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

(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 pasture growth rates, feed budgets and set appropriate stocking rates

Low: less than 1,000 kg DM/ha (sheep); 1,500 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: 1,500 – 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, page 5)
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

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

Pasture height

Pasture height
= 10 cm



(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, some species may be considered not edible during spring, when other green pasture is present but during summer may be considered as a valuable source of roughage
 - Low: less than 80%
 - Marginal: 80 – 99%
 - Ideal: 100%

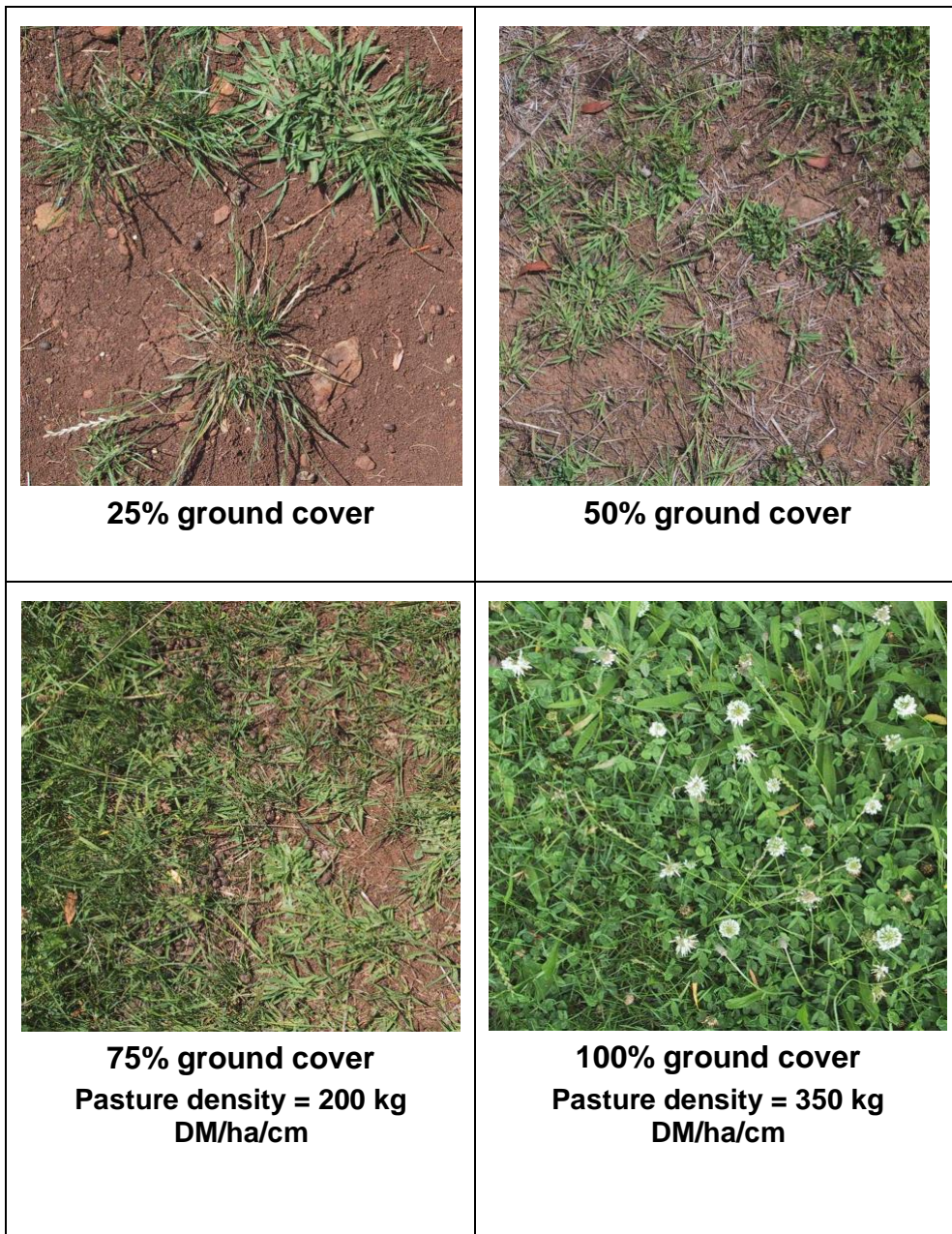
(C) Percentage green

- 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 autumn, winter and spring;
 - 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 (i.e. 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%
- Ground cover photos show examples of 25, 50, 75 and 100% ground cover

Ground cover

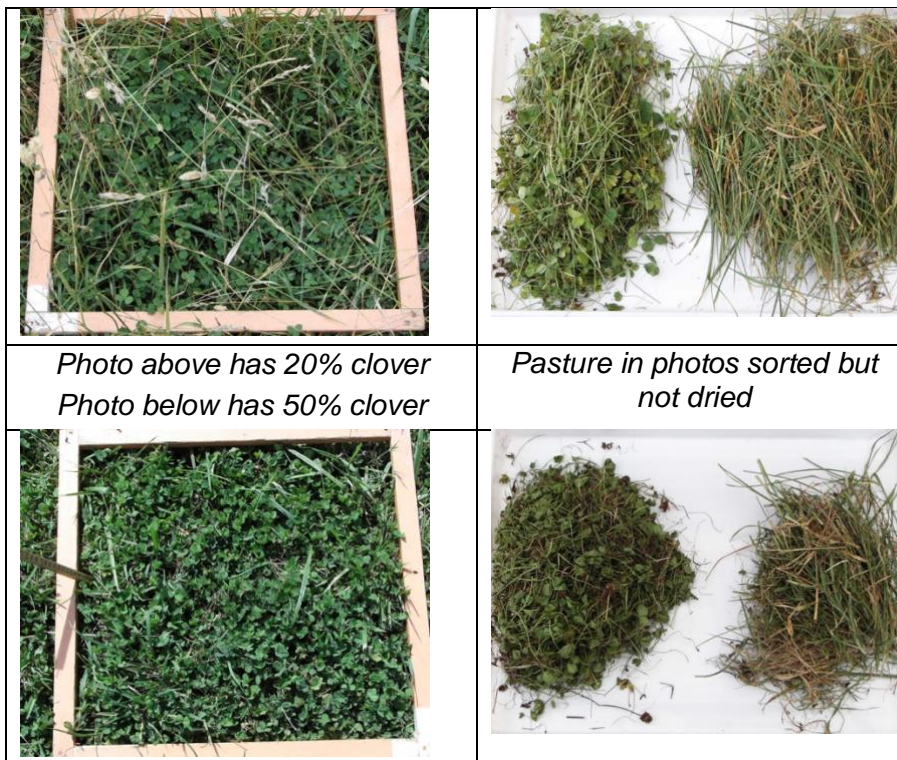


(E) Broadleaved plant component of herbage mass

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

(F) Legume component of herbage mass

- Includes clovers, medics, lucerne, lotus and native twinning legumes
- Measured as percent of herbage mass (%)
- Enhance the quality of the herbage (i.e. 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 autumn to spring;
 - 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 during summer or at the next dry spell when legumes disappear.



Note that the ideal levels of the pasture components listed here are aspirational. Most pastures of the south-west region will be dominated by annual grasses and what YOU consider to be the ideal ratio of annual:perennial will be influenced by your starting point and your pasture management goals. In multi species pastures the ideal percentages of the different components will be influenced by the sowing rates and successful establishment of the various species.

(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 the dominant source of seasonal feed, most evident during autumn, 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 year round
 - Low: less than 3
 - Marginal: 4 – 6
 - Ideal: greater than 7

Estimate once per year during late spring or more often if desired
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(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
Autumn	10	15	25
Winter	15	20	30
Spring	30	45	65
Summer	0	5	10

To calculate:

Step 1: Calculate average stocking rate 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 at start of period (HM1)

Step 4: Estimate herbage mass at end of period (HM2)

Calculation is:

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

As an example:

Where Stocking rate SR = 8 DSE/ha

Number of days in the period T = 90 days

Herbage mass at the start of period (day 1) HM1 = 1,000 kg DM/ha

Herbage mass at the end of period (day 90) HM2 = 3,000 kg DM/ha

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

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)

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

Calculation is:

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

As an example:

Where Pasture growth over the period PG = 30 kg DM/ha/day x 90 days

= 2,700 kg DM/ha/90 days) *see page 8 for details*

Rainfall during the period R = 300mm

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

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 September – 30th November, include rainfall from 24th August – 23rd November.

(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 most importantly calculated annually and best calculated over a period of at least 3 months. Utilisation will very likely be greater than 100% over summer indicating that animals are consuming more than pasture growth during that period
- 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
Autumn	35 – 40	45 – 50	55 – 60
Winter	35 – 40	45 – 50	55 – 60
Spring	25 – 30	30 – 35	35 – 40
Summer	Not applicable	Not applicable	Not applicable

Note: Values are highly dependent on pasture growth rates

To calculate:

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

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

Calculation is:

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

As an example:

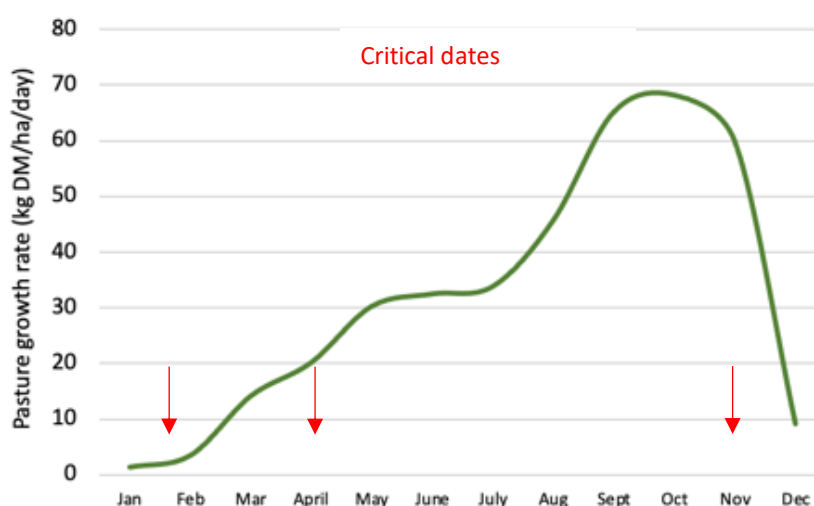
Where Pasture growth rate over the period PGR = 30 kg DM/ha/day

Average stocking rate over the period SR = 8 DSE/ha

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

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 1,000 kg DM/ha for sheep and 1,500 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 as a minimum should be conducted in late spring in advance of the expected non growth period and cover the intervening period till autumn, whenever you expect growth to begin. For example, from 1 November – 31 March. 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



Seasonal pasture growth curve and critical dates for feed budgeting

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	

To calculate

1. Available feed = $\frac{(HM1 - HM2)}{T} + PGR$
2. Number of stock units/ha = $\frac{\text{available feed}}{\text{DSE rating 'D'}}$
3. Number of stock units = (number of stock units/ha x paddock area 'A')

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 9)				
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