Chapter 6

Rationing

The procedure for ration formulation used here has the following steps:

- Set a target daily gain.
- Establish the DM, ME and CP contents of the feed ingredients.
- Predict the M/D of the final ration.
- Determine the daily ME requirement and the required CP level in the ration.
- Predict potential forage intake and calculate the amount of concentrate supplement required.
- Compile the daily ration.
- Draw up a feed budget for the whole feeding period.

The cells are cross referenced by letters from A to AO to help users follow through the calculations. Alternatively an Excel spreadsheet version is available at www.chalcombe.co.uk\downloads

(a) Cattle performance

Daily gain	A	kg	
Start weight	B	kg	
Final weight	C	kg	
Average weight	D	kg	(start + final) ÷ 2
Total gain	E	kg	(final - start weight)
Feeding period	F	days	(total gain ÷ daily gain)

(b) Feeds

List the feeds with their DM, ME and CP values from a feed analysis or using data from Table 3.1.

	Ration ingredient	**DM** (Decimal)	**ME** (MJ/kg DM)	**CP** (Decimal)
Forage	G	I	K	M
Concentrate	H	J	L	N

(c) Ration M/D

Daily gain (kg)	**Predicted M/D** (MJ ME/kg DM)
A	P

(d) ME and CP requirements

Average Liveweight (kg)	**Daily** gain (kg)	**ME** requirement (MJ ME/day)	**Ration** CP content (Decimal proportion)
D	A	Q	R

(e) Potential forage intake

Potential forage intake	S	kg	DM/day
Concentrate substitution	T	kg	reduction in forage DM per kg concentrate DM

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(f) ME from ad libitum forage

Forage	**ME content** (MJ ME/kg DM)	**x**	**Potential intake** (kg DM/day)	**ME supplied** (MJ ME/day)
G	K		S	U =K * S

(g) Is there a shortfall of ME from forage?

ME required	Q	MJ/day
ME from forage alone	U	MJ/day
Shortfall	V=Q-X	

(h) Calculate the net value of 1 kg concentrate DM

1 kg concentrate DM supplies	L	MJ ME
Less reduced forage DMI	T	kg
@ K MJ ME/kg DM =	X=K * T	MJ ME
Net value of 1 kg concentrate DM	Y = L - X	MJ ME/kg

(i) Daily concentrate requirement

Shortfall(g)	V	MJ ME ÷ Net value	Y	MJ ME/kg DM
=	Z = V / Y	x kg concentrate DM	L	MJ ME/kg DM
=	AA = Z * L	MJ ME/day		

(j) Actual forage intake

ME requirement	Q	MJ ME/day
Less concentrate ME	AA	MJ ME
= Forage ME required	AB = Q – AA	MJ ME/day
÷ Forage ME/kg DM	AC = AB / K	kg DM/day

(k) Check actual M/D

Feed ingredient	**DMI** (kg DM/day)		**ME** (MJ/day)	
G	AC		AD = K * AC	
H	Z		AE = L * Z	
Totals	AF = AC + Z		AG = AD + AE	
Actual M/D is total ME intake				
÷ total DMI =	AG / AF	MJ ME/kg DM		
Predicted M/D	P	MJ ME/kg DM		OK?

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(l) Check CP

Feed ingredient	**DMI**	**CP**	
		(DMI x Decimal CP in feed DM)	
G	AC	AH = AC * M	
H	Z	AI = Z * N	
Totals	AF	AJ = AH + AI	
Total CP ÷ Total DMI		AJ / AF	Decimal CP content OK?

(m) Daily ration

Feed ingredient	DMI	÷	Decimal DM content	=	Fresh weight
	(kg/day)		(b)		(kg/day)
G	AC		I		AK = AC * I
H	Z		J		AL = Z * J

(n) Feed budget

Feed ingredient	Daily ration	x	Days	=	Feed/head	x	Cattle	=	Total feed
	(kg)				(kg)				(Tonnes)
G	AK		F		AM = AK * F		AO		AM * AO
H	AL				AN = AL *F				AN * AO

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