



Nutrisi Pakan Ternak

PENGANTAR PAKAN RUMINANSIA

Pendahuluan

- ▶ Ternak ruminansia, alat pencernaan terdiri dari rumen, retikulum, omasum dan abomasum → mampu mencerna bahan pakan dengan serat kasar tinggi
- ▶ Pakan berupa hijauan dan pakan penguat (konsentrat). Pemberian hijauan $\pm 10\%$ dari berat badan, pakan penguat 1-2% dari berat badan. Usaha *Feedlot (dry lot fattening)*: sebagian besar pakan berupa konsentrat
- ▶ Hijauan: rumput, legum, tumbuhan lain (segar /silase, kering/hay)
- ▶ Pakan penguat (konsentrat): pakan yang mengandung serat kasar relatif rendah dan mudah dicerna (sumber energi dan protein). **Kapan harus diberi pakan konsentrat?**

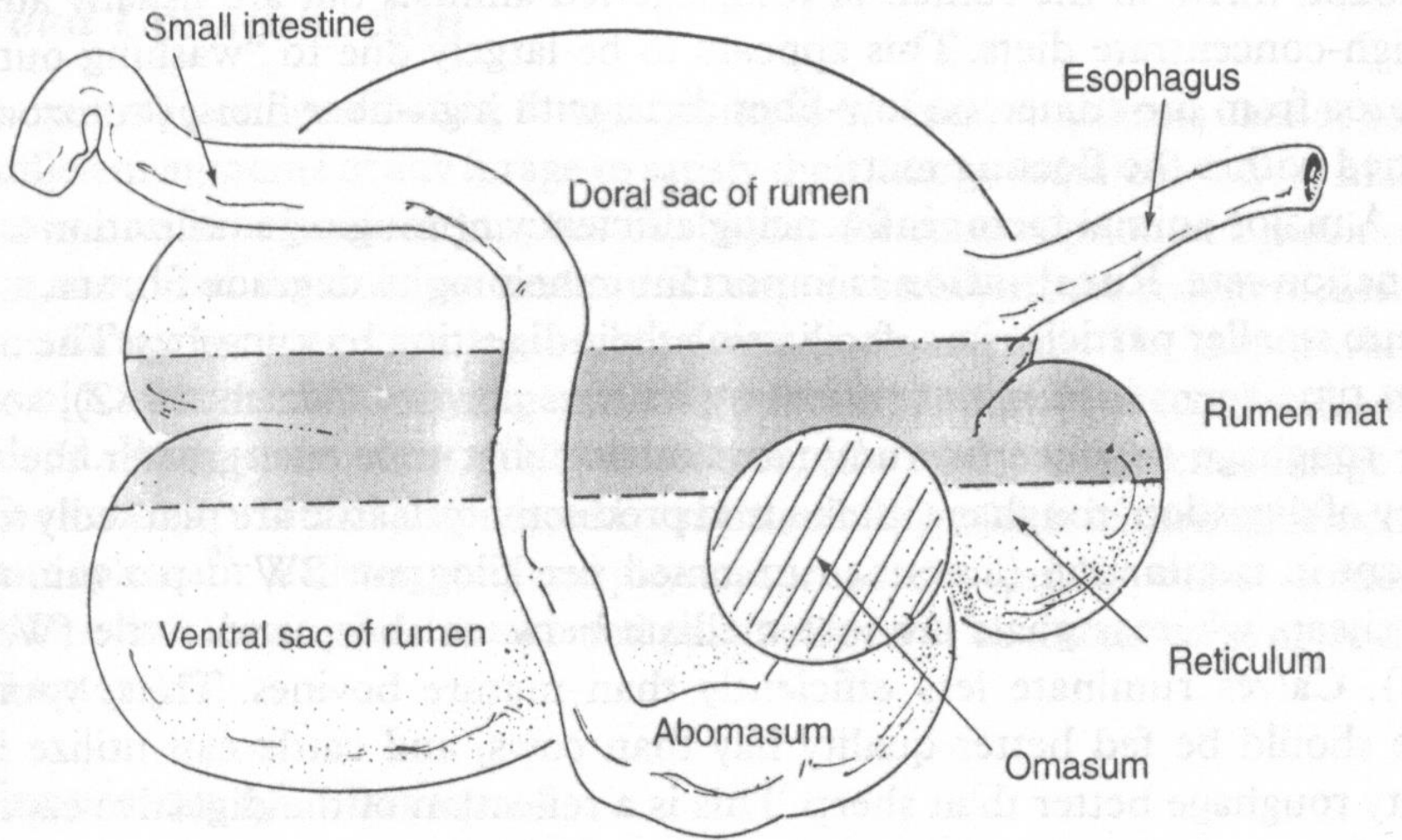


FIGURE 5.5 The rumen contents are stratified with a mat or raft of fibrous material floating on liquid. During rumination, a bolus is formed at the base of the esophagus and regurgitated. As forage is digested, the particle size is reduced, and the small particles drop to the bottom of the rumen and flow through the omasum.

KEGUNAAN PAKAN

- ▶ Hidup pokok (*maintenance*)
- ▶ Produksi: → pertumbuhan, produksi susu, tenaga kerja
- ▶ Reproduksi: → kawin, bunting, beranak, menyusui
- ▶ Kebutuhan pakan bervariasi tergantung dari berat badan dan status fisiologis ternak (induk kering, induk menyusui, pejantan, *grower*, *fattener*, tenaga kerja)

PRINSIP

- ▶ Bahan mudah diperoleh, tersedia di daerah setempat dan tidak beracun (*toxic*).
- ▶ Usahakan pakan tersedia secara kontinyu
- ▶ Bahan pakan diusahakan tidak bersaing dengan kebutuhan manusia (misal sisa hasil pertanian)
- ▶ Ransum secara kuantitas dan kualitas sesuai kebutuhan (tergantung berat badan dan ADG yang ingin dicapai). Hijauan dan konsentrat sesuai dengan berat badan dan kondisi / status fisiologis ternak
- ▶ Teknik pemberian efisien, disediakan tempat pakan dan air minum.

Faktor mempengaruhi pakan ruminansia

1. **Ternak**- berat badan, kondisi fisiologis
2. **Pakan** – kualitas, palatabilitas, jumlah yang diberikan, laju degradasi. **(Klasifikasi bahan pakan berdasarkan laju degradasi !)**
3. **Manajemen** – ransum serasi, teknik pemberian, pencampuran pakan, processing pakan

Kebutuhan Ternak

- **Spesies:** Bahan pakan yg digunakan untuk ruminansia berbeda dengan yang digunakan untuk monogastrik
- **Jenis kelamin** dan **bangsa**
- **Bentuk dalam penggunaan:** ransum untuk sapi perah mengandung lebih banyak hijauan, akan tetapi untuk sapi potong diberi pakan yg lebih banyak mengandung bijian
- **Umur** hewan: Hewan muda lebih banyak membutuhkan energy, protein, minerals, vitamins; kebutuhan akan menurun pada hewan yg tua.
- **Kondisi fisiologis:** kebuntingan, stress temperature, body composition

Energy requirements of beef cattle

Live weight, kg	150	200	250	300	350	400	450	500	550	600	650
Medium frame											
Growth kg/day	Maintenance energy requirement, NEm, MJ/day										
	15,8	19,6	23,2	26,6	29,8	33,0	36,0	39,0	41,9	44,7	-
0,4	Energy requirement of growth, NEg, MJ/day										
	-	-	-	-	6,1	6,8	7,4	8,0	8,6	9,2	-
0,6	5,0	6,3	7,4	8,5	9,5	10,5	11,5	12,5	13,4	14,3	-
0,7	6,0	7,4	8,8	10,1	11,3	12,5	13,6	14,7	15,8	16,9	-
0,8	6,9	8,6	10,2	11,6	13,1	14,4	15,8	17,1	18,3	19,6	-
0,9	7,9	9,8	11,6	13,2	14,9	16,4	18,0	19,4	20,9	22,3	-
1,0	8,8	11,0	13,0	14,9	16,7	18,4	20,2	21,8	23,4	25,0	-
1,1	9,8	12,2	14,4	16,5	18,5	20,5	22,4	24,2	26,0	27,8	-
1,2	10,8	13,4	15,8	18,2	20,4	22,5	24,6	26,6	28,6	-	-
1,3	11,8	14,6	17,3	19,8	22,3	24,6	26,9	29,1	-	-	-
1,4	-	15,9	18,8	21,5	24,1	26,7	29,2	-	-	-	-
Large frame											
Growth kg/day	Maintenance energy requirement, NEm, MJ/day										
	16,6	20,6	24,3	27,9	31,3	34,6	37,8	40,9	43,9	46,9	49,8
0,4	Energy requirement of growth, NEg, MJ/day										
	-	-	-	-	-	-	6,5	7,1	7,6	8,1	8,6
0,6	4,5	5,6	6,6	7,5	8,4	9,3	10,2	11,0	11,9	12,7	13,4
0,8	6,1	7,6	9,0	10,3	11,6	12,8	14,0	15,1	16,3	17,4	18,4
0,9	7,0	8,7	10,2	11,7	13,2	14,6	15,9	17,2	18,5	19,7	21,0
1,0	7,8	9,7	11,5	13,2	14,8	16,4	17,9	19,3	20,8	22,2	23,5
1,1	8,7	10,8	12,8	14,6	16,4	18,2	19,8	21,5	23,1	24,6	26,1
1,2	9,6	11,9	14,0	16,1	18,1	20,0	21,8	23,6	25,4	27,1	28,7
1,3	10,5	13,0	15,3	17,6	19,7	21,8	23,8	25,8	27,7	29,6	31,4
1,0	11,3	14,1	16,6	19,0	21,4	23,7	25,8	28,0	30,0	32,1	-
1,5	12,2	15,2	17,9	20,6	23,1	25,5	27,9	30,2	32,4	-	-
1,6	13,1	16,3	19,3	22,1	24,8	27,4	29,9	32,4	-	-	-
1,8	-	18,5	21,9	25,1	28,2	31,2	34,0	-	-	-	-

TABLE 1 Daily Nutrient Requirements of Goats^a

Body Weight (kg)	Feed Energy				Crude Protein		Ca (g)	P (g)	Vitamin A (1000 IU)	Vitamin D (IU)	Dry Matter per Animal			
	TDN (g)	DE (Mcal)	ME (Mcal)	NE (Mcal)	TP (g)	DP (g)					1 kg = 2.0 Mcal ME		1 kg = 2.4 Mcal ME	
											Total (kg)	% of kg BW	Total (kg)	% of kg BW
<i>Maintenance only (includes stable feeding conditions, minimal activity, and early pregnancy)</i>														
10	159	0.70	0.57	0.32	22	15	1	0.7	0.4	84	0.28	2.8	0.24	2.4
20	267	1.18	0.96	0.54	38	26	1	0.7	0.7	144	0.48	2.4	0.40	2.0
30	362	1.59	1.30	0.73	51	35	2	1.4	0.9	195	0.65	2.2	0.54	1.8
40	448	1.98	1.61	0.91	63	43	2	1.4	1.2	243	0.81	2.0	0.67	1.7
50	530	2.34	1.91	1.08	75	51	3	2.1	1.4	285	0.95	1.9	0.79	1.6
60	608	2.68	2.19	1.23	86	59	3	2.1	1.6	327	1.09	1.8	0.91	1.5
70	682	3.01	2.45	1.38	96	66	4	2.8	1.8	369	1.23	1.8	1.02	1.5
80	754	3.32	2.71	1.53	106	73	4	2.8	2.0	408	1.36	1.7	1.13	1.4
90	824	3.63	2.96	1.67	116	80	4	2.8	2.2	444	1.48	1.6	1.23	1.4
100	891	3.93	3.21	1.81	126	86	5	3.5	2.4	480	1.60	1.6	1.34	1.3
<i>Maintenance plus low activity (= 25% increment, intensive management, tropical range and early pregnancy)</i>														
10	199	0.87	0.71	0.40	27	19	1	0.7	0.5	108	0.36	3.6	0.30	3.0
20	334	1.47	1.20	0.68	46	32	2	1.4	0.9	180	0.60	3.0	0.50	2.5
30	452	1.99	1.62	0.92	62	43	2	1.4	1.2	243	0.81	2.7	0.67	2.2
40	560	2.47	2.02	1.14	77	54	3	2.1	1.5	303	1.01	2.5	0.84	2.1

Maintenance plus high activity (= 75% increment, arid rangeland, sparse vegetation, mountainous pastures, and early pregnancy)

10	278	1.22	1.00	0.56	38	26	2	1.4	0.8	150	0.50	5.0	0.42	4.2
20	467	2.06	1.68	0.94	64	45	2	1.4	1.3	252	0.84	4.2	0.70	3.5
30	634	2.78	2.28	1.28	87	60	3	2.1	1.7	342	1.14	3.8	0.95	3.2
40	784	3.46	2.82	1.59	108	75	4	2.8	2.1	423	1.41	3.5	1.18	3.0
50	928	4.10	3.34	1.89	128	89	5	3.5	2.5	501	1.67	3.3	1.39	2.7
60	1064	4.69	3.83	2.15	146	102	6	4.2	2.9	576	1.92	3.2	1.60	2.7
70	1194	5.27	4.29	2.42	165	114	6	4.2	3.2	642	2.14	3.0	1.79	2.6
80	1320	5.81	4.74	2.68	182	126	7	4.9	3.6	711	2.37	3.0	1.98	2.5
90	1442	6.35	5.18	2.92	198	138	8	5.6	3.9	777	2.59	2.9	2.16	2.4
100	1559	6.88	5.62	3.17	215	150	8	5.6	4.2	843	2.81	2.8	2.34	2.3

Additional requirements for late pregnancy (for all goat sizes)

397	1.74	1.42	0.80	82	57	2	1.4	1.1	213	0.71	0.59
-----	------	------	------	----	----	---	-----	-----	-----	------	------

Additional requirements for growth—weight gain at 50 g per day (for all goat sizes)

100	0.44	0.36	0.20	14	10	1	0.7	0.3	54	0.18	0.15
-----	------	------	------	----	----	---	-----	-----	----	------	------

Additional requirements for growth—weight gain at 100 g per day (for all goat sizes)

200	0.88	0.72	0.40	28	20	1	0.7	0.5	108	0.36	0.30
-----	------	------	------	----	----	---	-----	-----	-----	------	------

Additional requirements for growth—weight gain at 150 g per day (for all goat sizes)

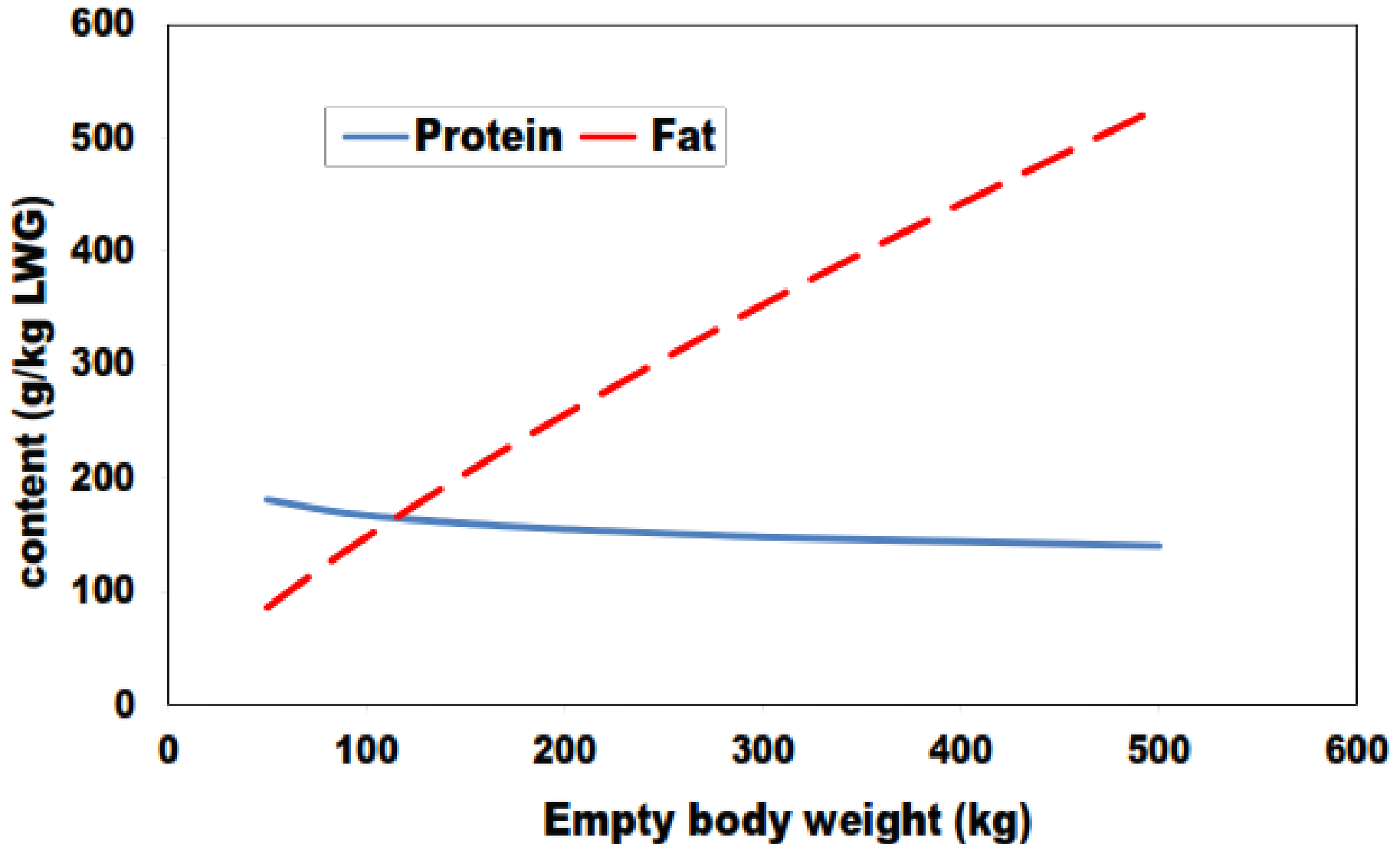
300	1.32	1.08	0.60	42	30	2	1.4	0.8	162	0.54	0.45
-----	------	------	------	----	----	---	-----	-----	-----	------	------

Additional requirements for milk production per kg at different fat percentages (including requirements for nursing single, twin or triplet kids at the respective milk production level)

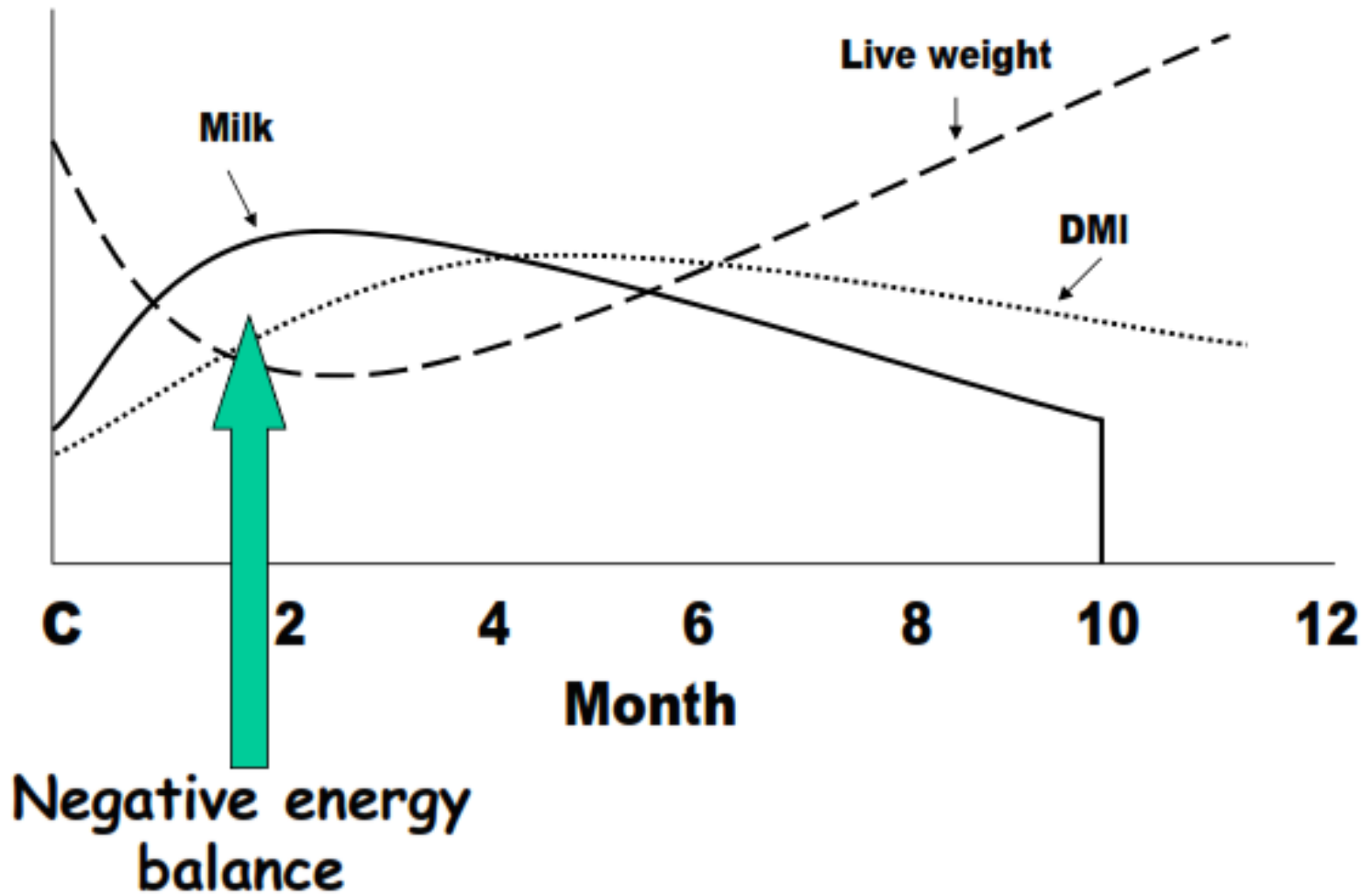
(% Fat)

2.5	333	1.47	1.20	0.68	59	42	2	1.4	3.8	760
3.0	337	1.49	1.21	0.68	64	45	2	1.4	3.8	760
3.5	342	1.51	1.23	0.69	68	48	2	1.4	3.8	760
4.0	346	1.53	1.25	0.70	72	51	3	2.1	3.8	760
4.5	351	1.55	1.26	0.71	77	54	3	2.1	3.8	760
5.0	356	1.57	1.28	0.72	82	57	3	2.1	3.8	760

PENGARUH UMUR TERHADAP KEBUTUHAN NUTRIEN



KONDISI PADA TERNAK LAKTASI



PENGARUH STRES TEMPERATUR

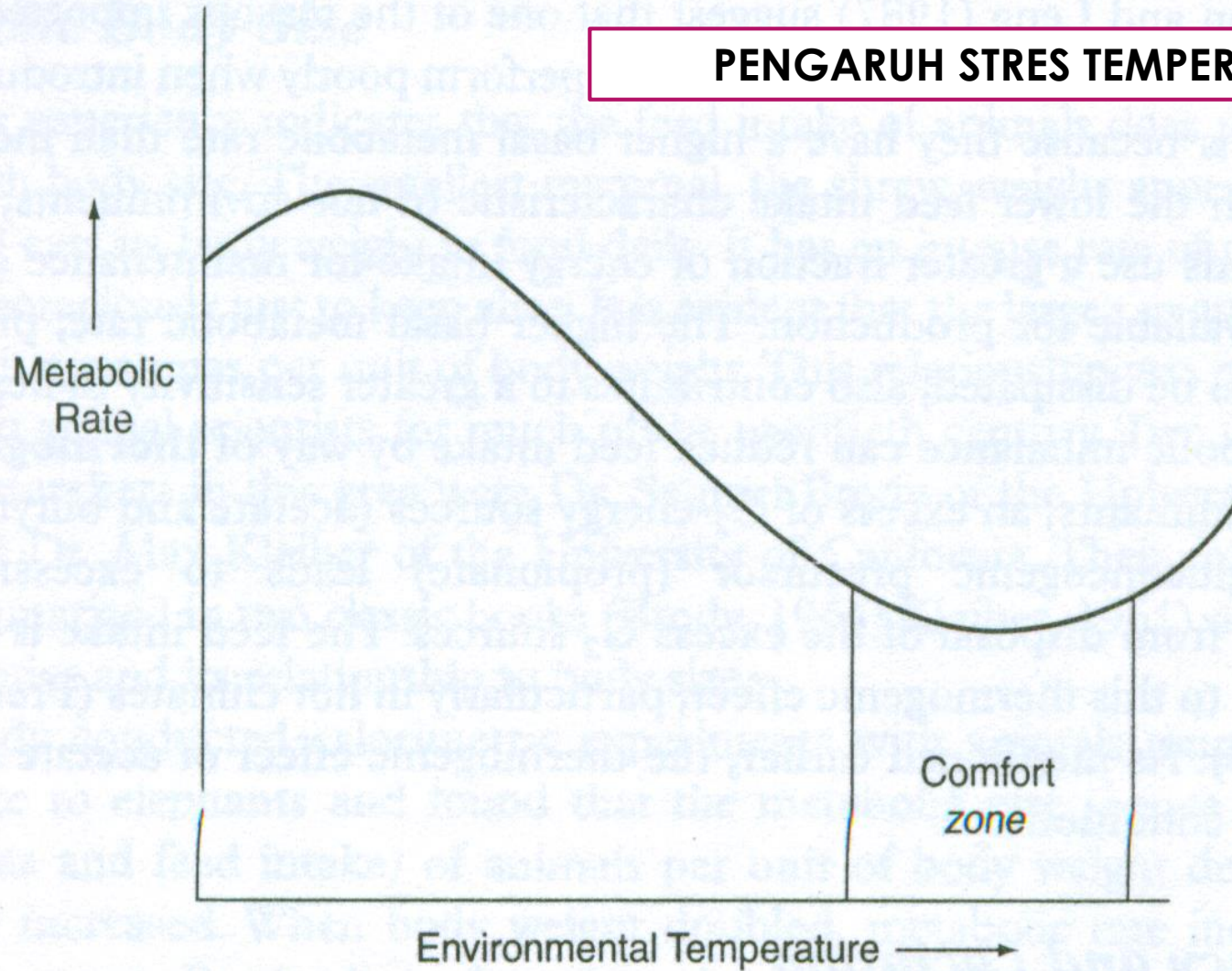
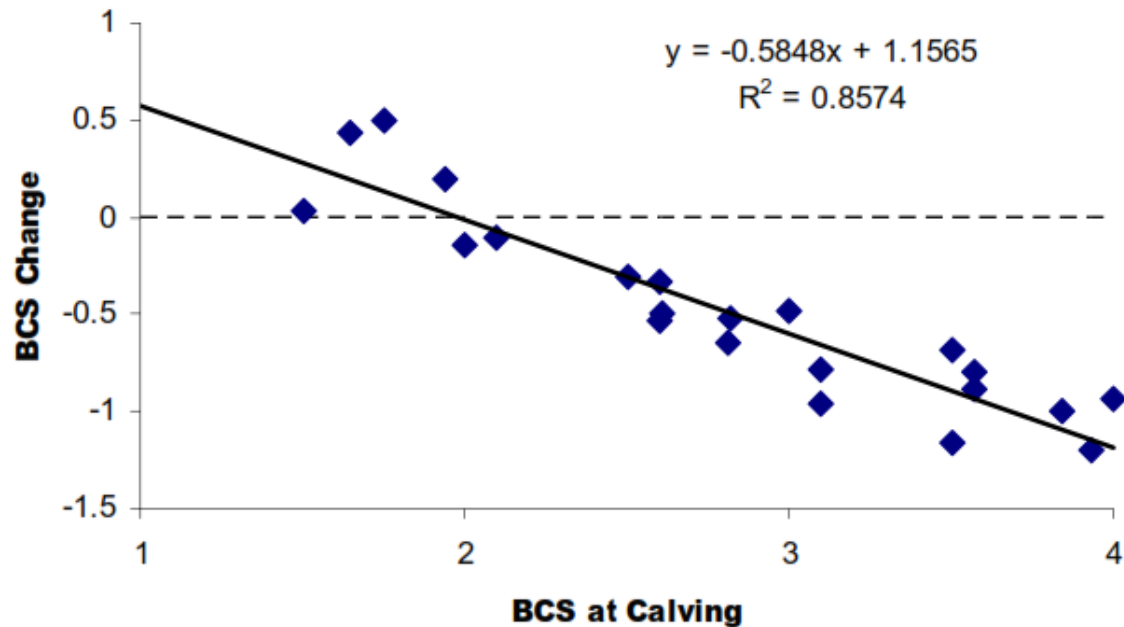


FIGURE 9.3 Metabolic rate (and consequently feed intake) is at a minimum in the environmental temperature range where the animal does not need to employ cooling or heating mechanisms (the comfort zone). At low temperatures, metabolic rate is increased to maintain body temperature, so feed intake is also increased.

Pengaruh body composition

Fatter cows lose more condition

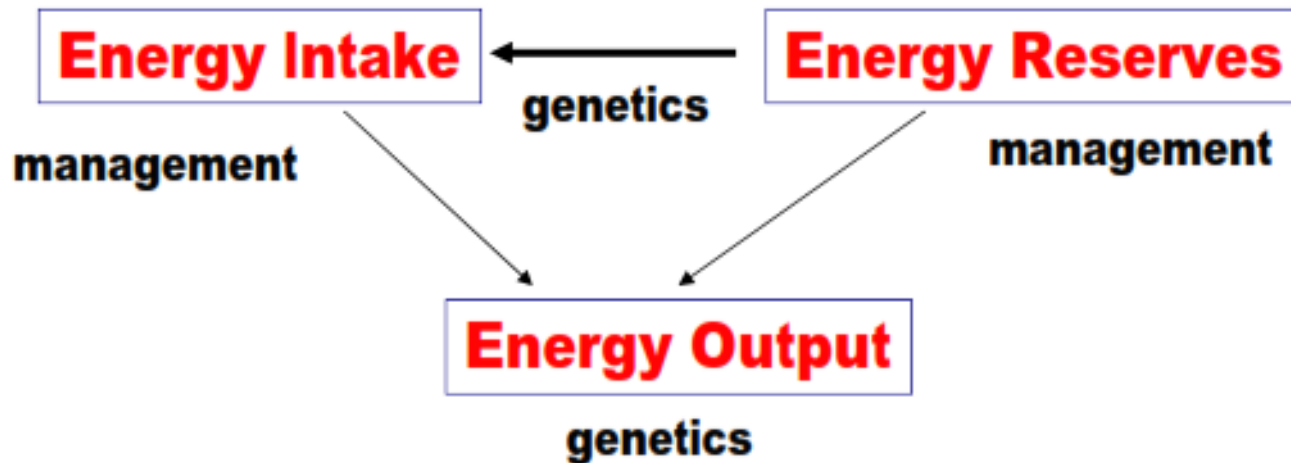


8 Studies, 22 groups
1,357 cows

Garnsworthy, 1988

22

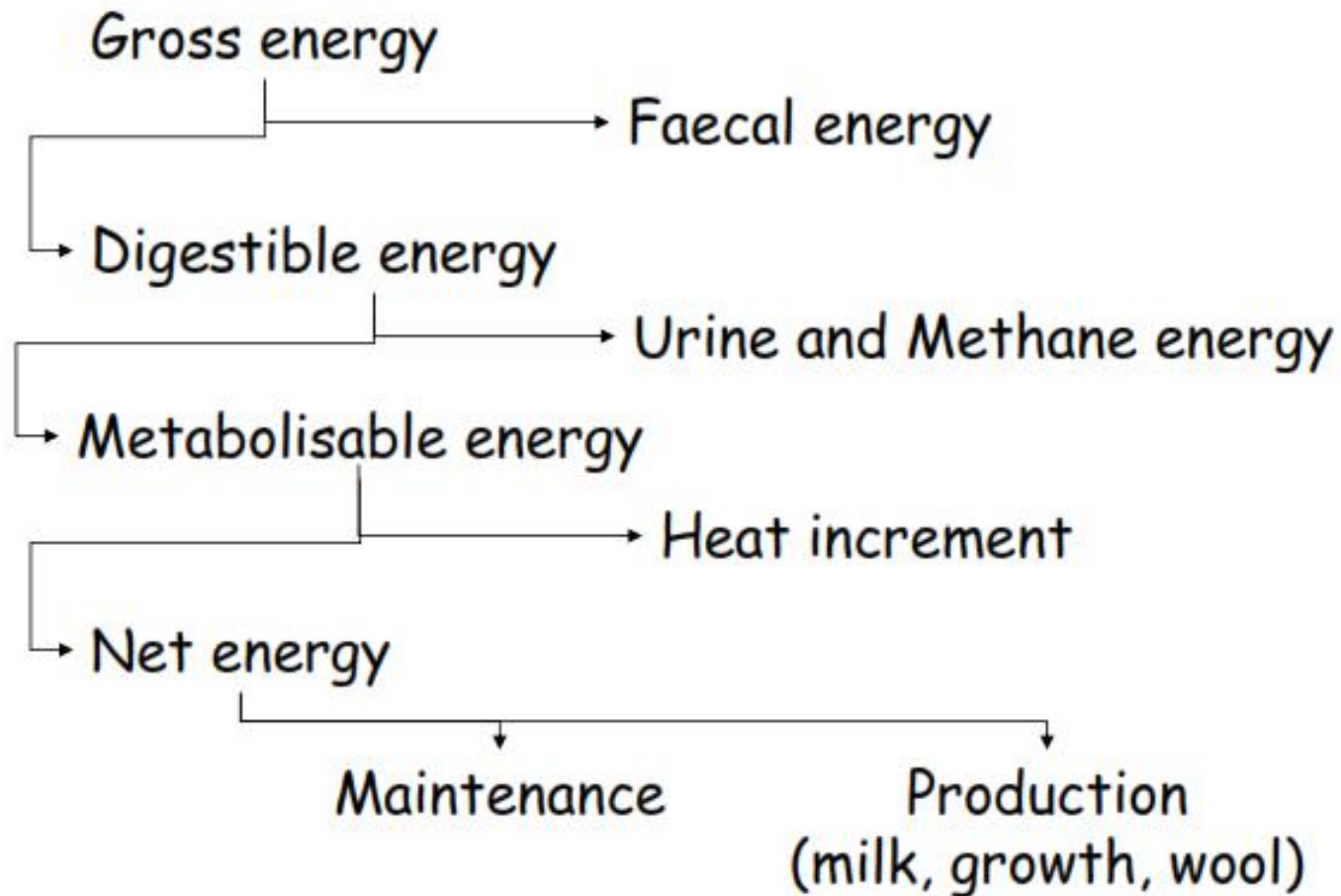
Pengaruh body composition



Faktor Pakan

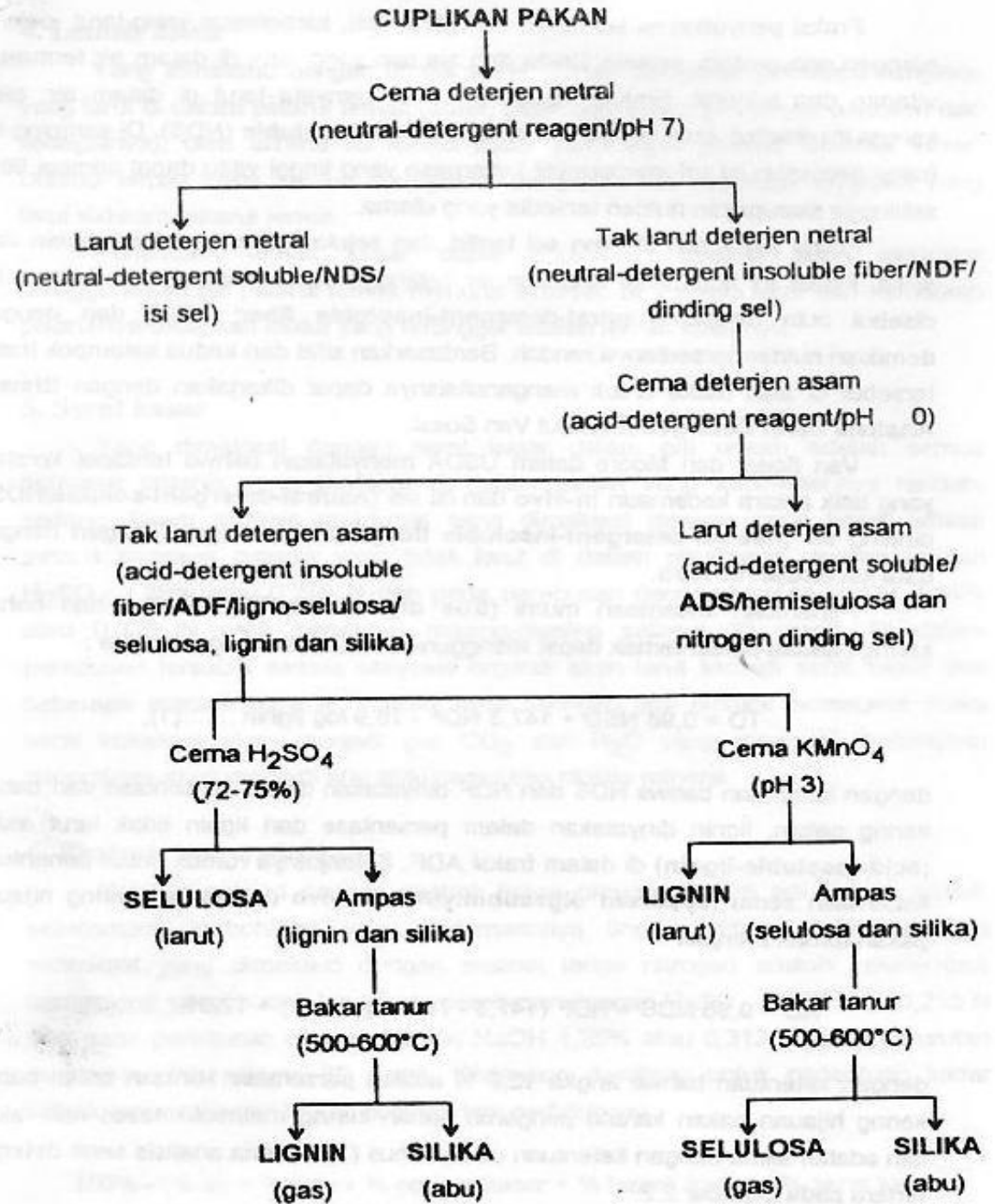
- **Chemical**
 - **Konsentrasi energi**
 - **Komposisi serat:** NDF, lignin
 - **Kandungan nutrient:** kandungan N pakan
- **Physical**
 - **Moisture** (DM concentration of diet)
 - **Ukuran partikel**
 - **Densitas**

Energy Partition





ANALISIS SERAT

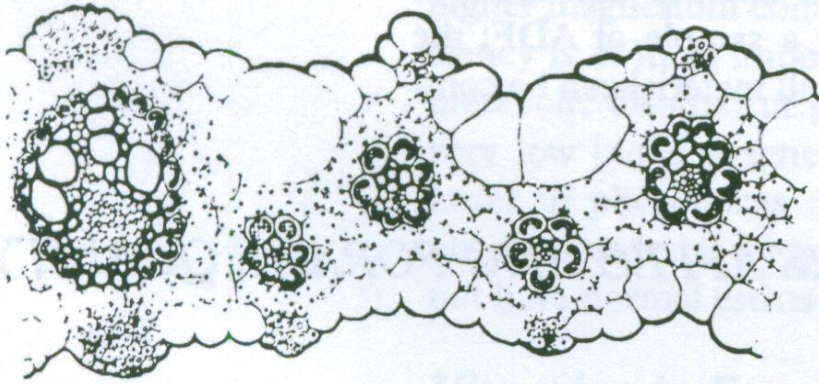


Komposisi Serat

GRASS

LEGUME

TROPICAL

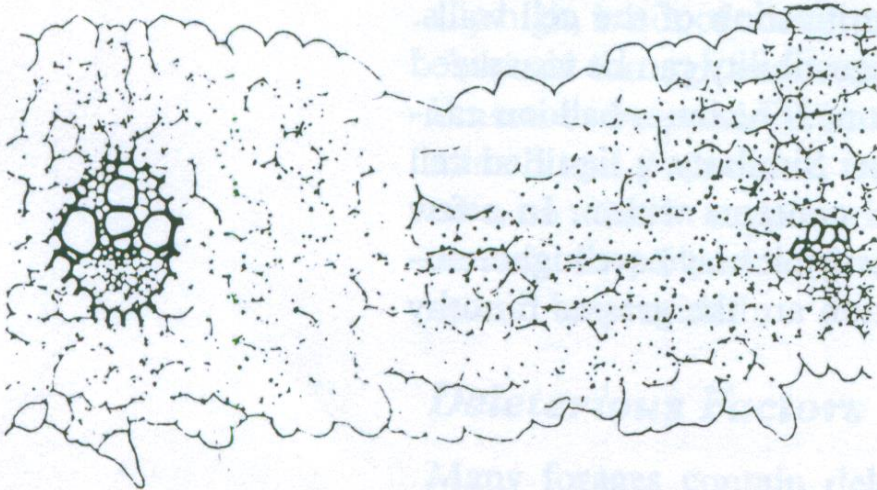


Cenchrus ciliaris

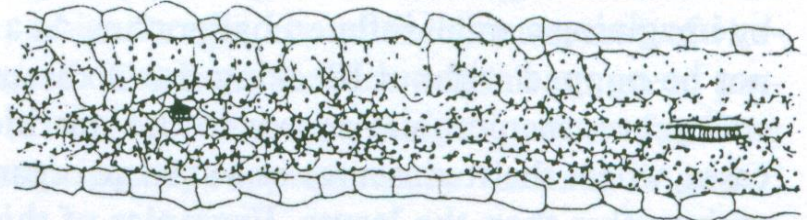


Macroptilium atropurpureum

TEMPERATE

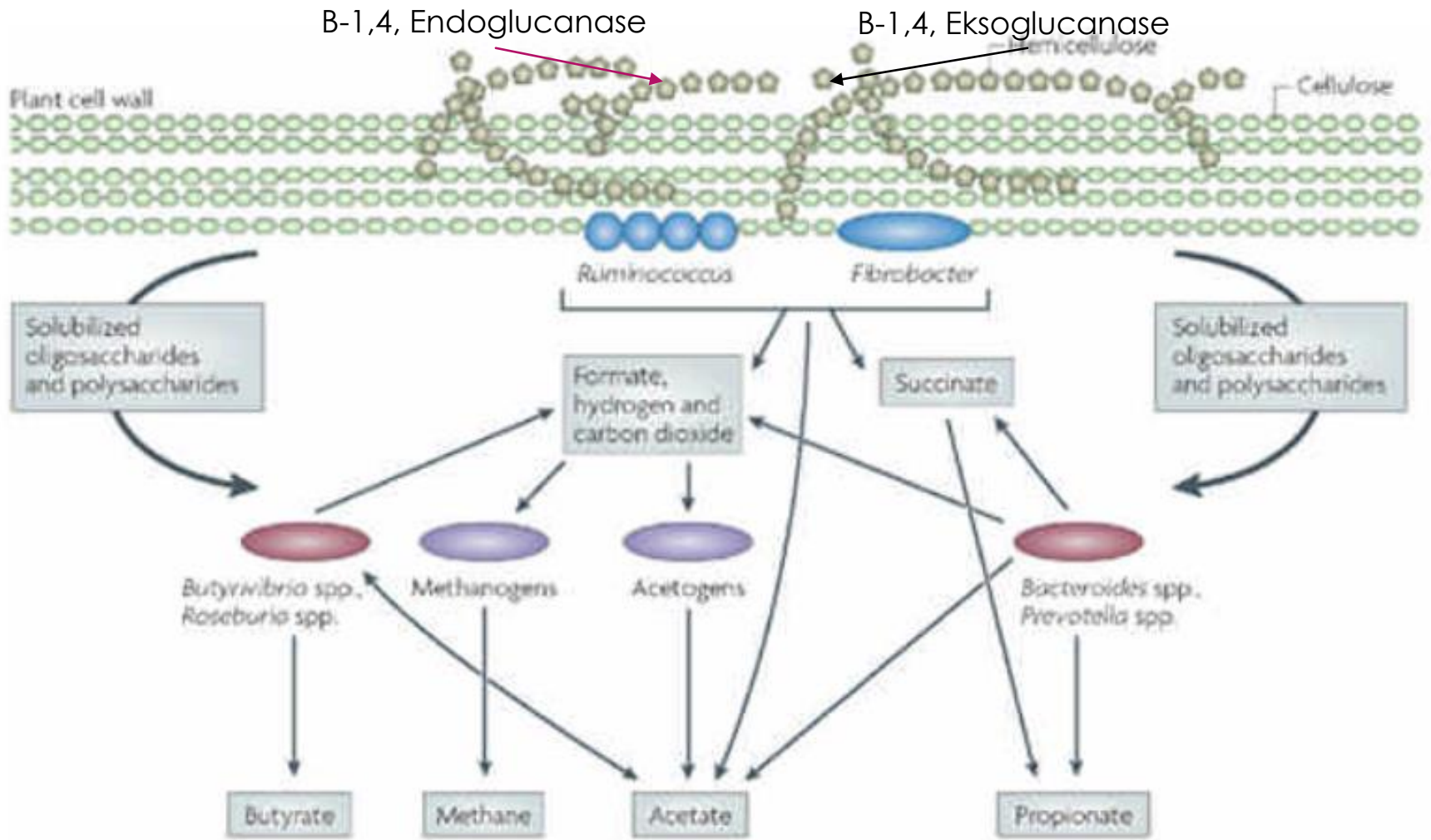


Phalaris tuberosa



Trifolium repens

FIGURE 5.2 Cross sections of the leaves of tropical and temperate grasses and legumes. Tropical grasses have a high content of vascular bundles and tightly packed mesophyll cells. These materials present a high resistance to mechanical and microbial breakdown in the rumen, which accounts for their low digestibility. (Courtesy of D. J. Minson and J. R. Wilson in *J. Australian Institute of Agricultural Science* 46:247–249, 1980.)



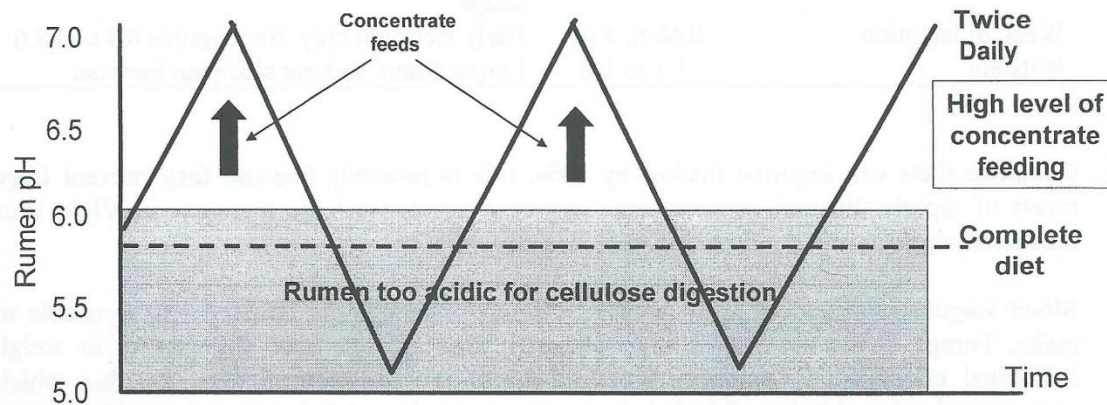
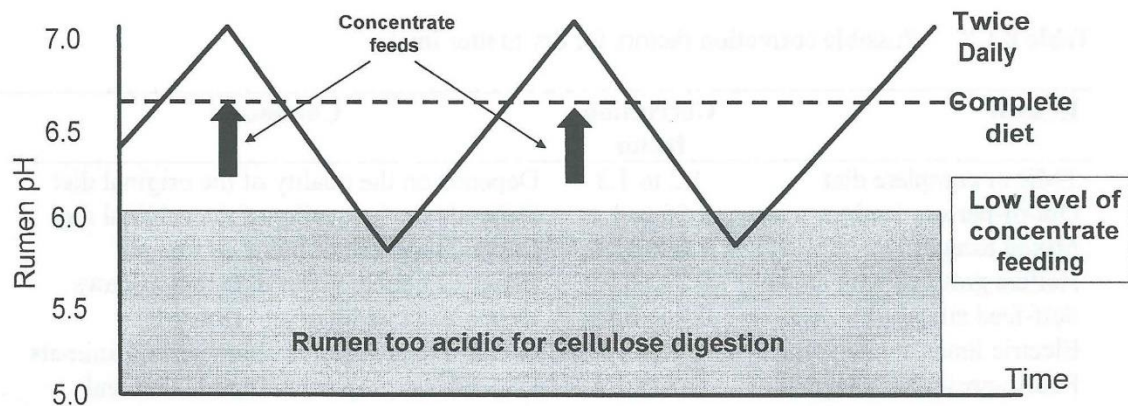
Klasifikasi fraksi karbohidrat

Fraksi	Jenis KHO	Kelaratam	k (%/jam)
A	KHO bukan struktural (gula)	Larut	75–350
B1	KHO bukan struktural (pati; pektin)	Tidak larut; degradasi cepat	5–40
B2	KHO struktural (NDF, ADF)	Tidak larut; degradasi lambat	3–14
C	KHO struktural dan terikat lignin	Tidak larut; tidak terdegradasi	0

k=Laju degradasi dalam rumen

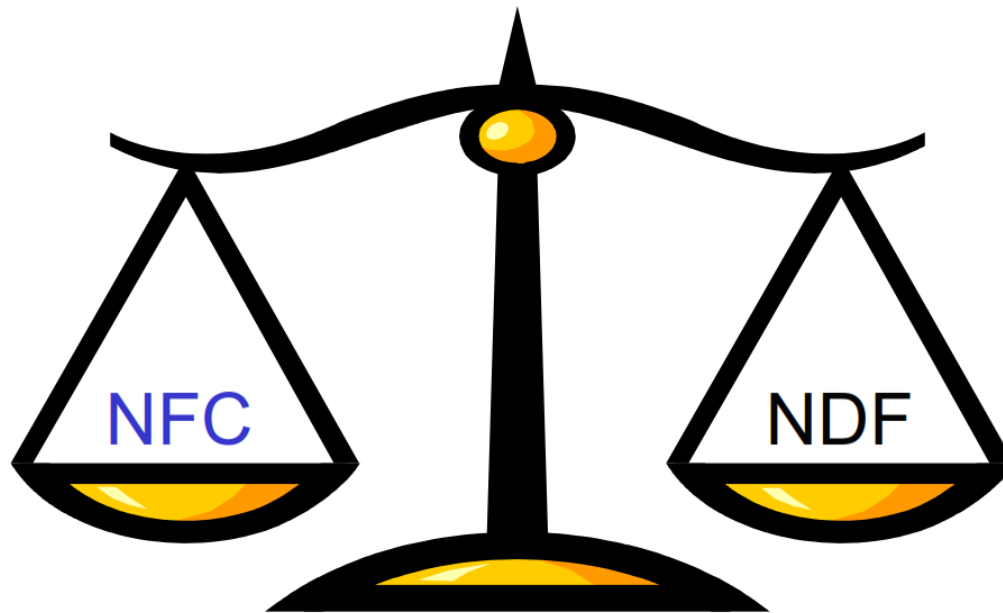
Sniffen et al., 1992

Ransum dan pH Rumen



Orskov, 1987

Balancing Nutrient



More energy	}	Produksi	}	Less energy
Less filling				More filling
More Acid	}	Kesehatan	}	Less Acid
Less buffering				More buffering

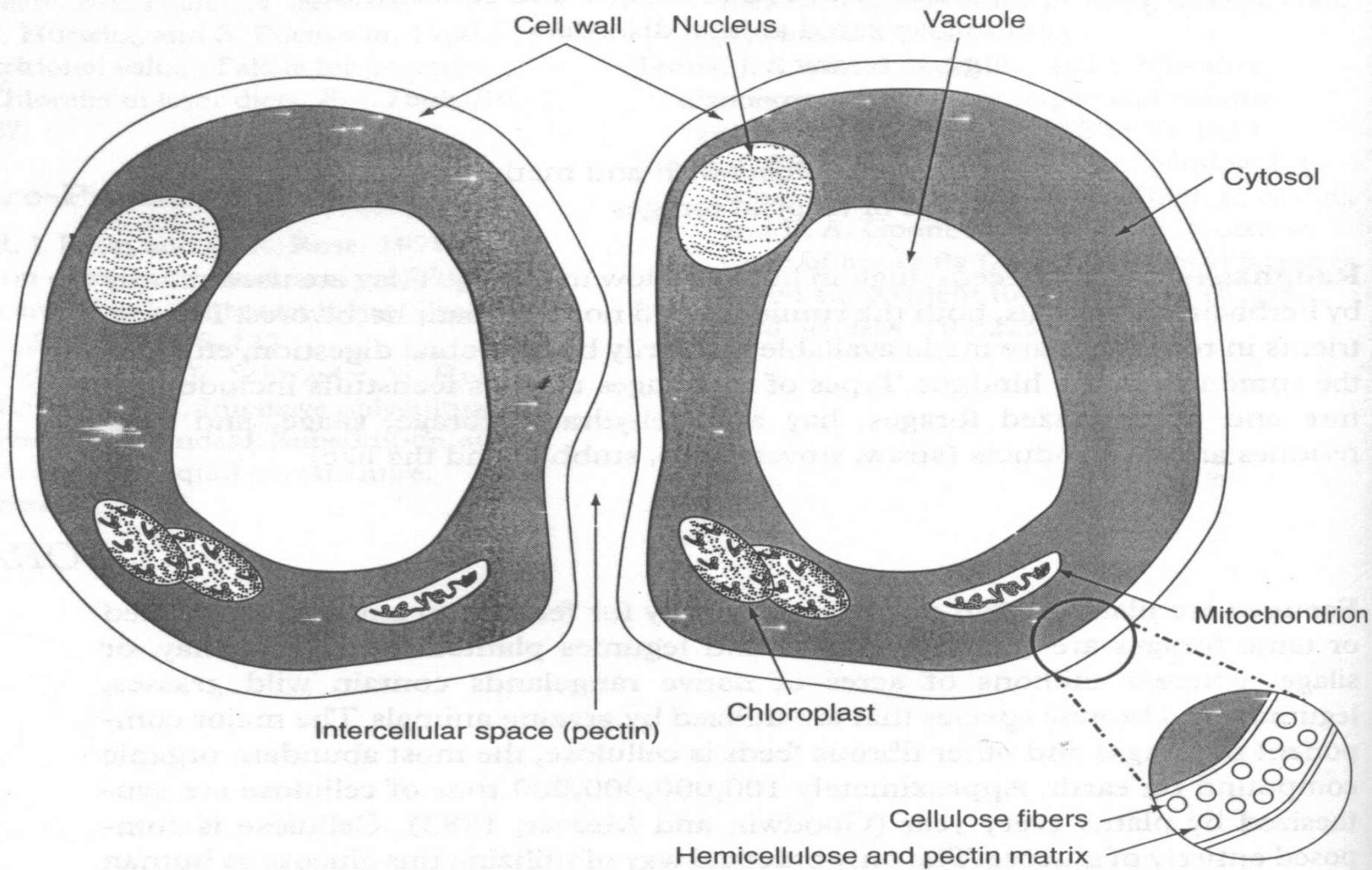


FIGURE 5.1 Simplified diagram of forage plant tissue cells. The highly digestible cell contents are encased in the less digestible cell wall. The nutritive value of a forage depends on the accessibility of the cell contents to microbial enzymes, which in turn depends on the structure of the cell wall.

Kandungan Nutrien Bahan Pakan

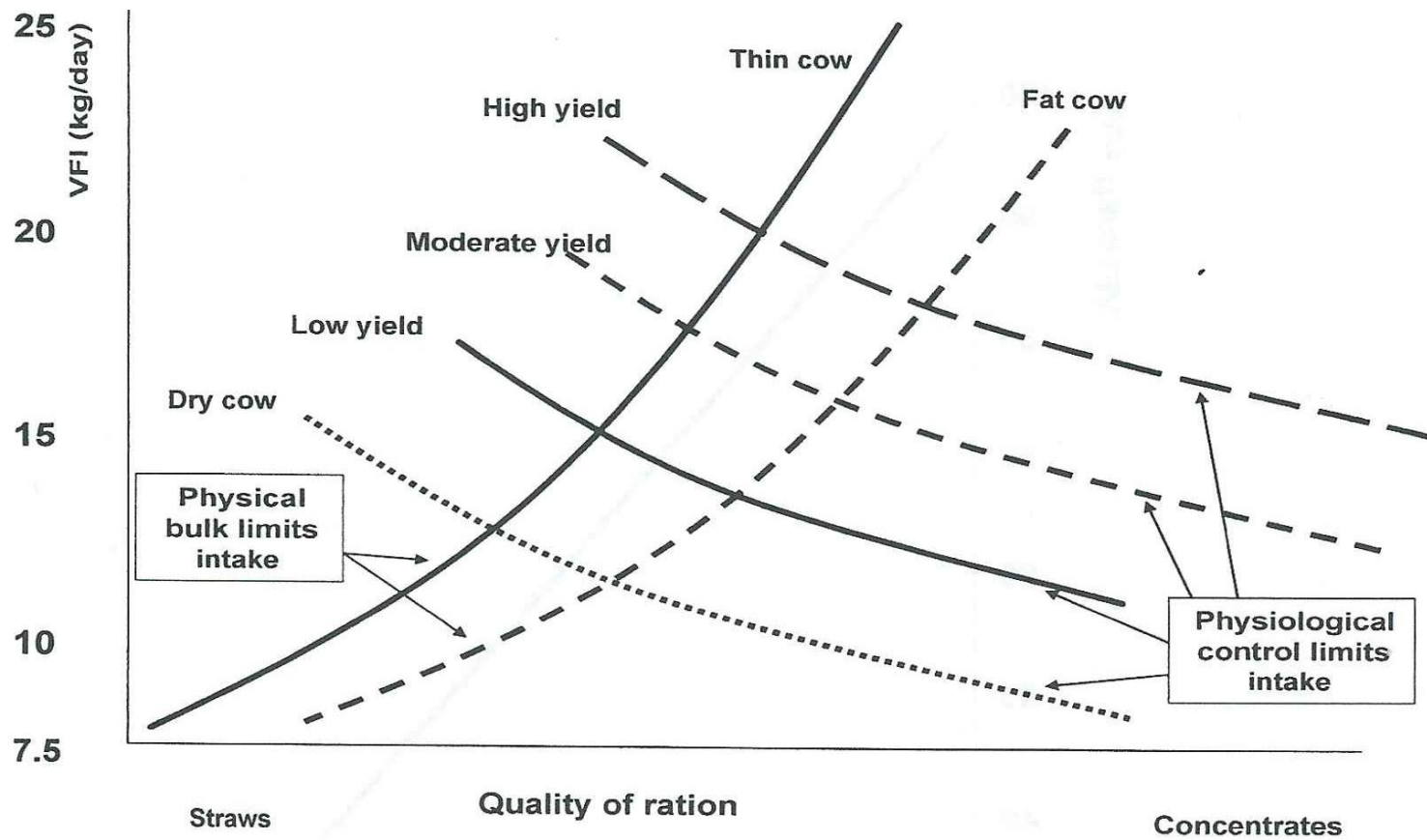
- Kandungan nutrien bahan pakan
 - Dapat **dianalisa** di laboratorium
 - Dapat ditemukan dalam **buku referensi**
- Untuk ruminansia nilai kebutuhan berikut yg digunakan:
 - Bahan kering, NE, protein kasar, serat kasar, Ca, P,

Appendix Table 1
COMPOSITION OF FEEDSTUFFS COMMONLY FED TO CATTLE, SHEEP, AND
HORSES (DATA FROM NRC PUBLICATIONS)

Feed Name and Description	Intl. Feed Number	Typical DM, %	Energy Utilization, Dry Basis, Mcal/kg											Energy Utilization, Dry Basis, Mcal/kg															
			Composition, Dry Basis, %						Beef Cattle					Dairy Cattle					Sheep					Horses		Rabbits			
			CP	CF	NDF	ADF	Ca	P	DE	ME	NE _m	NE _g	TDN, ^a %	DE	ME	NE _m	NE _g	NE _t	DE	ME	NE _m	NE _g	TDN, %	DE	TDN, %	DE	Dig. Protein (%)		
1. Alfalfa, fresh, late veg.	2-00-181	21	20.0	23	38	29	2.19	0.33	2.78	2.28	1.41	0.83	63	1.	—	—	—	—	—	—	—	—	—	2.94	—	—	—		
2. Alfalfa, fresh	2-00-196	24	20.0	26	—	—	1.96	0.30	2.69	2.27	1.31	0.61	61	2.	—	—	—	—	—	2.56	2.10	1.24	0.68	58	2.51	57	—		
3. Alfalfa, hay, S-C, early bloom	1-00-059	90	18.0	23	42	31	1.41	0.22	2.43	1.99	1.14	0.58	60	3.	2.65	2.22	1.31	0.74	1.35	2.47	2.03	1.18	0.61	56	2.48	55	2.05	64	
4. Alfalfa, hay, S-C, mature	1-00-071	91	13.0	38	58	44	1.13	0.18	2.21	1.81	0.97	0.42	50	4.	—	—	—	—	—	2.38	1.95	1.11	0.55	54	—	—	1.50	60	
5. Alfalfa, meal, dehy. 17%	1-00-023	92	18.9	26	45	35	1.52	0.25	2.69	2.21	1.34	0.77	61	5.	2.69	2.27	1.34	0.77	1.38	2.65	2.17	1.34	0.77	60	2.36	—	2.10	64	
6. Alfalfa, silage, wilted, midbloom	3-00-217	38	15.5	30	47	35	—	—	2.56	2.10	1.24	0.68	58	6.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7. Alfalfa, silage, 30-50% dry matter	3-08-150	43	9.8	19	—	—	1.39	0.27	—	—	—	—	—	7.	—	—	—	—	—	2.56	2.10	1.24	0.68	58	—	—	—	—	
8. Bakery waste, dried	4-00-466	92	10.7	1	18	13	0.14	0.26	3.92	3.22	2.21	1.52	89	8.	3.92	3.51	2.20	1.52	2.06	—	—	—	—	—	—	—	—	—	—
9. Barley grain	4-00-549	88	13.5	6	19	7	0.05	0.38	3.70	3.04	2.06	1.40	84	9.	3.70	3.29	2.06	1.40	1.94	3.79	3.11	2.12	1.45	86	3.60	82	3.41	67	
10. Barley grain, Pacific Coast	4-07-939	89	10.8	7	21	9	0.06	0.39	3.79	3.11	2.12	1.45	86	10.	3.79	3.38	2.12	1.45	1.99	3.88	3.18	2.18	1.50	88	3.68	79	3.35	65	
11. Barley straw	1-00-498	91	4.3	42	80	49	0.30	0.07	1.76	1.45	0.60	0.08	40	11.	2.16	1.73	0.93	0.53	1.08	2.12	1.74	0.90	0.35	48	1.62	37	0.75	20	
12. Bean, Navy, seeds	5-00-623	89	25.3	5	—	—	0.18	0.59	3.70	3.04	2.06	1.40	84	12.	3.70	3.29	2.06	1.40	1.94	3.84	3.15	2.15	1.48	87	—	—	3.55	80	
13. Beet, Sugar, pulp, dehy.	4-00-669	91	9.7	20	54	33	0.69	0.10	3.26	2.68	1.76	1.14	74	13.	3.44	3.02	1.88	1.24	1.79	2.96	2.43	1.60	1.04	67	2.56	65	2.72	50	
14. Bermuda grass, fresh	2-00-712	34	12.0	26	—	—	0.53	0.21	2.65	2.17	1.31	0.74	60	14.	—	—	—	—	—	—	—	—	—	—	2.07	50	—	—	
15. Bermuda grass hay, SC	1-00-703	90	6.0	31	78	38	0.43	0.20	2.16	1.77	0.93	0.39	49	15.	—	—	—	—	—	1.97	1.62	0.85	0.35	45	—	—	—	—	
16. Bluegrass, Kentucky fresh, early veg.	2-00-777	31	17.4	25	55	29	0.50	0.44	3.17	2.60	1.70	1.08	72	16.	3.17	2.76	1.69	1.08	1.64	2.87	2.35	1.47	0.88	65	2.09	56	—	—	
17. Bluestem, fresh, early veg.	2-00-821	27	12.8	25	—	—	0.63	0.20	3.00	2.46	1.57	0.97	68	17.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
18. Brewer's grains, dehy.	5-02-141	92	29.4	14	46	24	0.33	0.55	2.91	2.39	1.51	0.91	66	18.	2.91	2.49	1.51	0.91	1.50	3.09	2.53	1.63	1.03	70	2.75	68	2.85	76	
19. Brome, fresh, early veg.	2-00-892	34	18.0	24	56	31	0.50	0.30	3.26	2.68	1.76	1.14	74	19.	3.26	2.85	1.75	1.13	1.69	3.53	2.89	1.94	1.30	80	3.00	68	—	—	
20. Brome hay, late bloom, S-C	1-00-888	89	10.0	37	68	43	0.30	0.35	2.43	1.99	1.14	0.58	55	20.	2.60	2.18	1.27	0.70	1.33	—	—	—	—	—	2.38	54	—	—	
21. Citrus pulp, dehy.	4-01-237	91	6.7	13	23	22	1.84	0.12	3.62	2.97	2.00	1.35	77	21.	3.40	2.98	1.86	1.22	1.77	3.70	3.04	2.06	1.40	84	2.99	68	3.15	60	
22. Clover, Crimson, hay, S-C	1-01-328	87	18.4	30	—	—	1.40	0.22	2.51	2.06	1.21	0.64	57	22.	2.51	2.09	1.21	0.64	1.28	2.43	1.99	1.14	0.58	55	2.16	49	—	—	
23. Clover, Ladino, fresh, early veg.	2-01-380	19	27.2	14	—	—	1.93	0.35	3.00	2.46	1.57	0.97	68	23.	3.00	2.58	1.57	0.97	1.55	—	—	—	—	—	2.50	—	—	—	—
24. Clover, Ladino, hay, S-C	1-01-378	90	22.0	21	36	32	1.35	0.31	2.65	2.17	1.31	0.74	65	24.	2.87	2.45	1.47	0.88	1.47	2.91	2.39	1.51	0.91	66	2.56	51	—	—	
25. Clover, Red, fresh, early bloom	2-01-428	20	19.4	23	40	31	2.26	0.38	3.04	2.50	1.60	1.00	69	25.	3.04	2.62	1.60	1.00	1.57	3.00	2.46	1.57	0.47	68	2.01	57	—	—	
26. Clover, Red, hay, S-C	1-01-415	89	16.0	29	56	36	1.53	0.25	2.43	1.99	1.14	0.58	55	26.	2.43	2.00	1.14	0.58	1.23	2.65	2.17	1.31	0.74	60	2.22	49	—	—	
27. Corn, Dent, fodder	1-28-231	81	8.9	25	55	33	0.50	0.25	2.87	2.35	1.47	0.88	65	27.	—	—	—	—	—	2.78	2.28	1.41	0.83	63	2.06	—	—	—	
28. Corn, Cobs, ground	1-28-234	90	3.2	36	89	35	0.57	0.10	2.21	1.81	0.97	0.42	50	28.	2.21	1.78	0.97	0.42	1.11	2.25	1.84	1.07	0.45	51	1.36	31	—	—	
29. Corn distillers grains, dehy.	5-28-235	94	23.0	12	43	17	0.11	0.43	3.79	3.11	2.12	1.45	86	29.	3.79	3.38	2.12	1.45	1.99	3.84	3.15	2.12	1.48	87	3.08	70	—	—	
30. Corn ears, ground	4-28-238	87	9.0	9	28	11	0.07	0.27	3.66	3.00	2.03	1.37	83	30.	3.66	3.25	2.03	1.37	1.91	3.66	3.00	2.03	1.37	83	3.49	74	—	—	
31. Corn gluten, meal	5-28-241	91	46.8	5	37	9	0.16	0.50	3.79	3.11	2.12	1.45	86	31.	3.79	3.38	2.12	1.45	1.99	3.88	3.18	2.18	1.50	88	3.29	—	—	—	
32. Corn gluten feed	5-28-243	90	25.6	10	45	12	0.36	0.82	3.66	3.00	2.03	1.37	83	32.	3.66	3.25	2.03	1.37	1.91	3.66	3.00	2.03	1.37	83	—	—	3.15	70	
33. Corn grain, #2	4-02-931	88	10.1	2	9	3	0.02	0.35	3.97	3.25	2.24	1.55	90	33.	3.53	3.12	1.94	1.30	1.84	3.84	3.15	2.15	1.48	87	3.84	88	3.56	65	
34. Corn grain, flaked	4-28-244	86	11.2	1	9	3	0.03	0.29	4.19	3.44	2.38	1.67	95	34.	3.88	3.47	2.18	1.50	2.04	—	—	—	—	—	—	—	—	—	—
35. Corn grain, high moisture	4-20-770	72	10.7	3	9	3	0.02	0.32	4.10	3.36	2.33	1.62	93	35.	3.88	3.47	2.18	1.50	2.06	—	—	—	—	—	—	—	—	—	—
36. Corn silage, well-earled	3-28-250	33	8.1	24	51	28	0.23	0.22	3.09	2.53	1.63	1.03	70	36.	3.09	2.67	1.63	1.03	1.60	3.09	2.53	1.63	1.03	70	2.68	—	—	—	—
37. Cotton, seed hulls	1-01-599	91	4.1	48	90	64	0.15	0.09	1.85	1.52	0.68	0.15	42	37.	1.98	1.55	0.78	0.25	0.98	2.16	1.77	0.93	0.39	49	1.89	33	1.90	25	
38. Cottonseeds	5-01-614	92	23.9	21	39	29	0.16	0.75	4.23	3.47	2.41	1.69	96	38.	4.23	3.83	2.41	1.69	2.23	—	—	—	—	—	—	—	4.10	75	

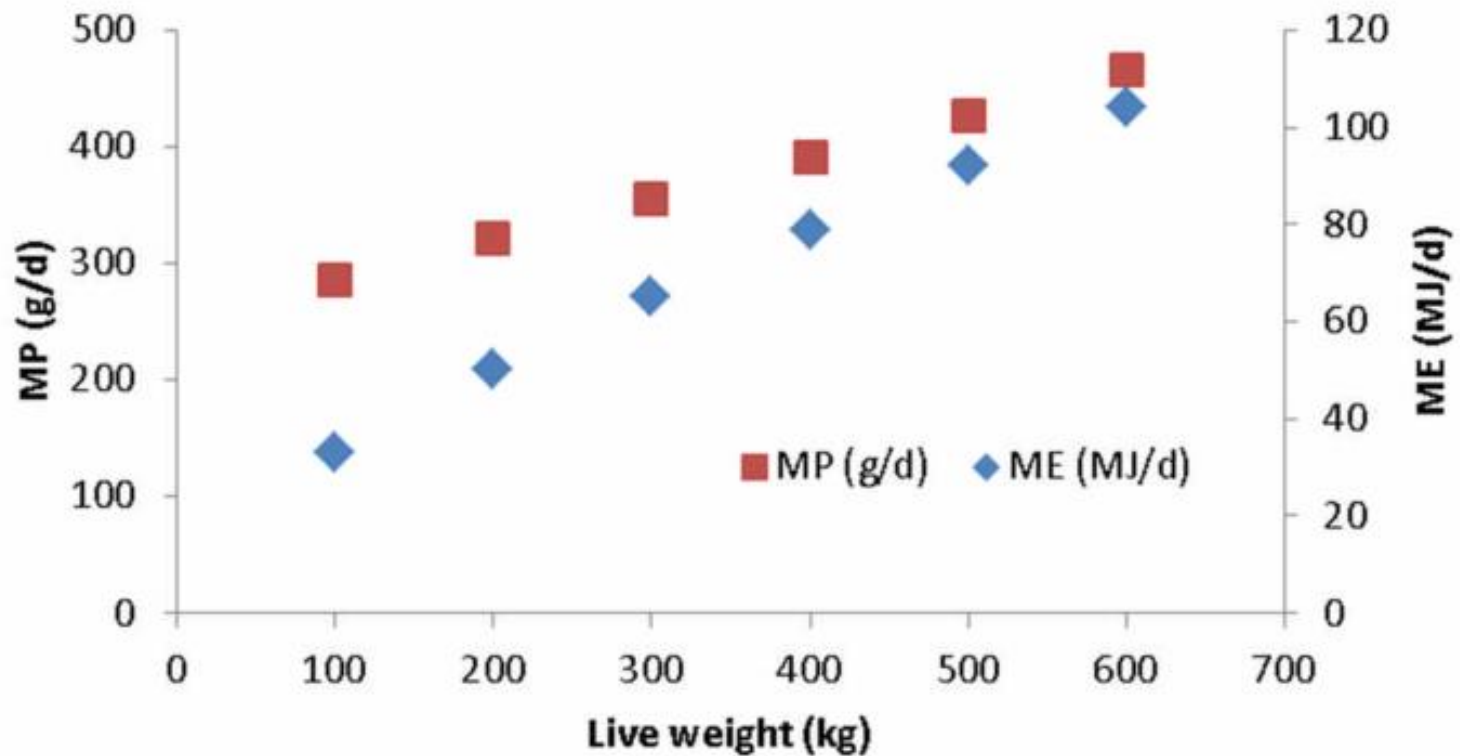
^aTDN values apply to both beef and dairy cattle.

Animal and Feed Factors



Forbes, 1983

Animal and Feed Factors

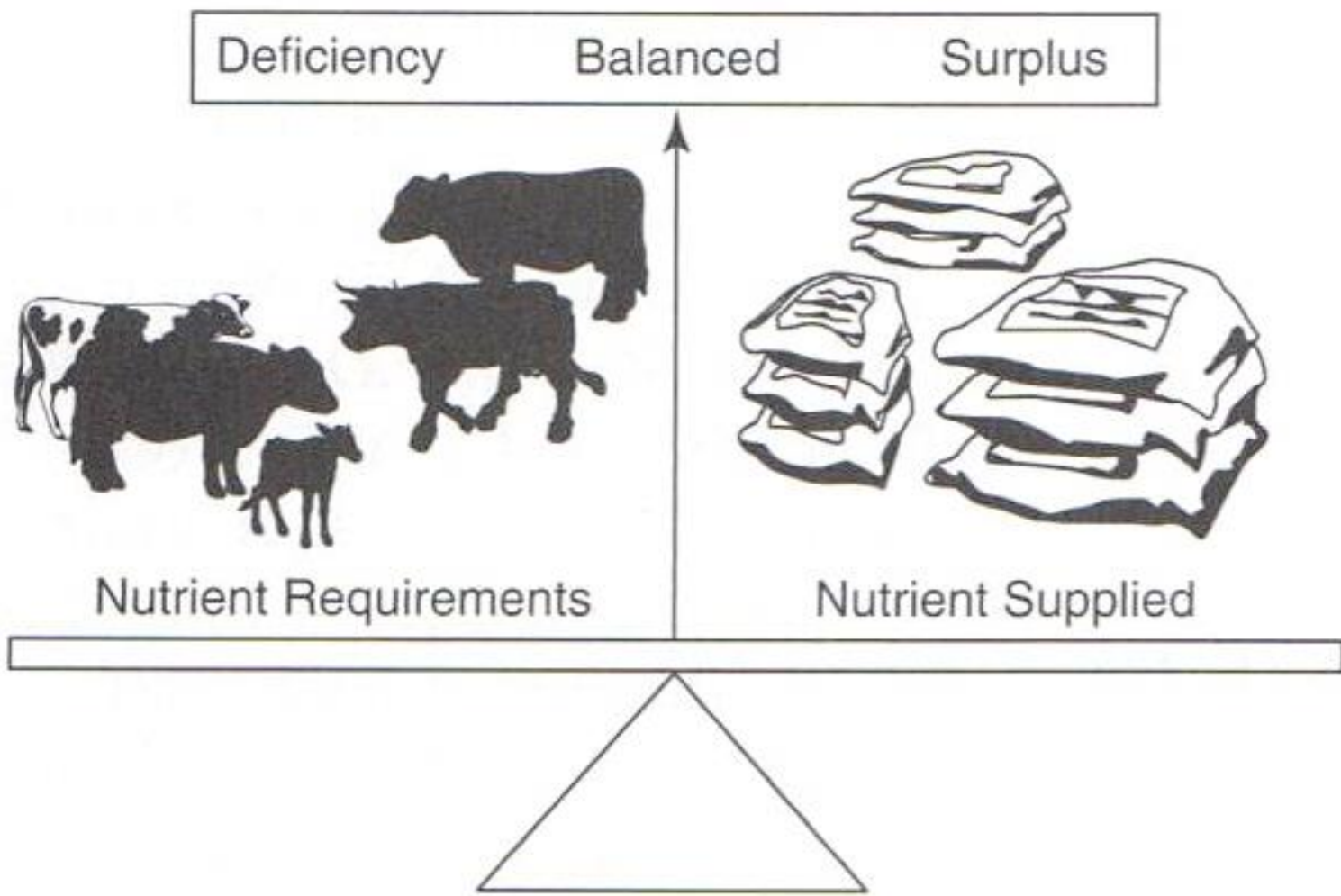


Garnsworthy, 2013

Ransum Seimbang

- Ransum seimbang atau ransum serasi (*balanced ration*) adalah ransum yang **memenuhi** semua **kebutuhan nutrien** oleh ternak sesuai dengan tujuan pemeliharaan baik dari segi **jenis**, **jumlah** maupun **imbangan** nutrien.

- **Tujuan:** memenuhi kebutuhan hewan dengan nutrisi pakan.
- Ada **konsekuensi ekonomi** dan welfare apabila ransumnya “out of balance” baik surplus maupun defisiensi.
- Proses dapat **akurat** tergantung informasi terkait terpenuhi (kebutuhan hewan, kandungan nutrisi pakan).



Tipe Ransum



*complete feed / total
mixed ration*
(ransum lengkap)



pemberian terpisah
antara konsentrat
dan hijauan

TERIMAKASIH