National Diploma Animal Production

Livestock Production Part 5

Handout 9

Feed Rations

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ADAPTING FEED RATIONS TO PRODUCTION STAGES OF THE ANIMALS

Farmers are advised to make use of an experienced nutritionist to formulate rations for their own mixing programmes.

Pearson Square

Should a farmer want to mix two or even three ingredients, making use of the Pearson square method or by iteration, a reasonably effective ration can be formulated. Usually standard tables reflecting the composition of the different ingredients are used, although the chemical analysis of the same type of feed can differ significantly from batch to batch.

Daily Nutrient Requirements for Maintenance, Growth and Fattening of Steers

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
150	0.00	22	22	22	22	22	22	230	130	5	5	6
	0.25	29	29	28	27	27	27	460	270	13	11	8
	0.50	38	36	35	34	33	32	515	320	14	12	9
	0.75			43	41	40	38	560	365	19	15	9
	1.00				50	48	46	600	410	25	18	9
	1.25					58	56	640	455	31	21	9
175	0.00	24	24	24	24	24	24	260	150	5	5	7
	0.25	32	31	30	30	29	29	485	285	12	11	8
	0.50	41	39	38	37	36	35	525	325	14	13	10
	0.75		49	47	45	43	41	570	370	19	16	10

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	1.00			56	54	52	50	610	415	24	18	10
	1.25				66	63	60	650	460	29	21	10
200	0.00	27	27	27	27	27	27	300	170	6	6	8
	0.25	35	35	34	34	33	33	510	300	10	10	12
	0.50	44	42	41	39	38	37	555	345	14	13	12
	0.75		53	50	48	46	45	610	395	19	16	13
	1.00			61	58	55	53	655	445	23	18	13
	1.25				70	67	64	700	495	27	20	13
	1.50					81	77	750	545	31	22	13
225	0.00	29	29	29	29	29	29	325	185	7	7	8
	0.25	37	37	36	35	35	34	525	310	11	11	13
	0.50	47	45	44	42	41	40	580	360	14	13	13
	0.75		56	53	51	49	48	645	420	18	16	13
	1.00			65	62	59	57	700	475	24	19	13
	1.25				75	71	68	745	530	28	22	13
	1.50					86	82	810	590	32	23	13

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
250	0.00	31	31	31	31	31	31	350	200	8	8	9
	0.25	40	39	38	38	37	36	570	330	12	12	14
	0.50	51	49	47	45	44	43	635	375	13	13	14
	0.75		60	57	54	52	51	715	430	18	16	14
	1.00			69	65	63	60	790	485	24	20	14
	1.25				79	75	72	855	540	30	23	14
	1.50					91	87	915	595	34	25	14
300	0.00	36	36	36	36	36	36	405	230	9	9	10
	0.25	46	45	44	44	43	43	595	345	13	13	16
	0.50	57	55	53	51	50	49	660	390	16	16	16
	0.75	72	66	64	61	59	57	735	440	19	18	16
	1.00		81	77	73	70	67	805	495	24	21	16
	1.25			93	88	83	80	875	550	28	23	16
	1.50				107	101	96	925	600	33	27	16
	1.75					124	112	965	655	37	30	16
350	0.00	40	40	40	40	40	40	455	260	10	10	12

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	0.25	51	49	48	48	47	47	690	400	15	15	18
	0.50	63	60	58	56	55	54	745	440	17	16	18
	0.75	78	73	70	67	65	63	800	480	19	17	18
	1.00		89	84	80	77	74	855	525	22	19	18
	1.25			103	97	92	88	905	570	25	21	18
	1.50				117	110	105	945	615	30	26	18
	1.75					135	128	985	670	34	30	18
400	0.00	45	45	45	45	45	45	510	290	11	11	13
	0.25	56	55	54	53	53	52	715	415	15	15	19
	0.50	70	67	65	63	61	60	770	455	17	17	19
	0.75	85	80	77	74	72	69	850	510	19	18	19
	1.00		99	93	89	85	82	900	555	21	20	19
	1.25			112	105	100	96	950	600	24	22	19
	1.50				127	120	115	990	645	27	24	19
	1.75					147	139	1030	700	30	26	19
450	0.00	49	49	49	49	49	49	545	310	12	12	14

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	0.25	61	60	59	58	57	56	765	445	16	16	20
	0.50	75	72	70	68	67	66	840	495	18	18	20
	0.75	91	87	83	80	78	76	900	540	19	19	20
	1.00		1063	100	95	91	88	950	585	20	20	20
	1.25			120	114	108	104	1000	630	24	23	20
	1.50				137	130	124	1040	675	26	24	20
	1.75					158	150	1075	730	28	25	20
500	0.00	54	54	54	54	54	54	595	340	13	13	15
	0.25	67	65	64	63	62	62	810	470	17	17	23
	0.50	82	79	76	74	73	72	890	525	18	18	23
	0.75	100	94	90	87	84	82	940	565	19	19	23
	1.00		114	108	103	99	95	990	610	20	20	23
	1.25			129	123	117	112	1030	650	22	22	23
	1.50				147	140	133	1060	690	24	24	23
	1.75					170	161	1105	750	26	26	23

Daily Nutrient Requirements of Breeding Stock in a Beef Herd

Live mass (kg)	Daily gain (kg/day)	Min DM consumption (kg/day)	Roughage (%)	ME (MJ)	CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
Pregnant yearling heifers - last 3 to 4 months of pregnancy									
325	0.4	6.6	100	53	580	340	15	15	19
	0.6	8.5	100	68	750	420	18	18	23
	0.8	9.4	85-100	84	850	500	22	20	26
350	0.4	6.9	100	55	610	350	15	15	19
	0.6	8.9	100	71	780	450	19	19	25
	0.8	10	85-100	88	880	510	22	21	28
375	0.4	7.2	100	57	630	360	15	15	20
	0.6	9.3	100	74	810	460	19	19	26
	0.8	11	85-100	92	960	550	22	22	31
400	0.4	7.5	100	59	650	380	16	16	21
	0.6	9.7	100	77	840	480	19	19	27
	0.8	11.6	85-100	96	1010	500	22	22	33
425	0.4	7.8	100	62	690	400	16	16	22
	0.6	10.1	100	80	880	500	19	19	28
	0.8	12.1	85-100	100	1050	600	22	22	34

Dry, pregnant mature cows - middle third of pregnancy									
350		5.5	100	45	320	150	10	10	15
400		6.1	100	50	360	170	11	11	17
450		6.7	100	54	390	190	12	12	19
500		7.2	100	59	420	200	13	13	20
550		7.7	100	63	450	220	14	14	22
600		8.3	100	67	490	230	15	15	23
Dry, pregnant mature cows - last third of pregnancy									
350	0.4	6.9	100	55	410	190	12	12	19
400	0.4	7.5	100	60	440	210	14	14	21
450	0.4	8.1	100	64	480	230	15	15	23
500	0.4	8.6	100	69	510	240	15	15	24
550	0.4	9.1	100	73	540	250	16	16	26
600	0.4	9.7	100	77	570	270	17	17	27

Cows nursing calves - average milking ability - first 3 to 4 months post-partum									
350		8.2	100	67	750	440	24	24	19
400		8.8	100	71	810	480	25	25	21
450		9.3	100	76	860	500	26	26	23
500		9.8	100	80	900	530	27	27	24

550		10.5	100	85	970	570	28	28	26
600		11	100	89	1010	590	28	28	27
Cows nursing calves - superior milking ability - first 3 to 4 months post-partum									
350		10.2	100	88	1110	650	45	40	32
400		10.8	100	92	1170	690	45	41	34
450		11.3	100	97	1230	720	45	42	36
500		11.8	100	102	1290	760	46	43	38
550		12.4	100	106	1350	790	46	44	41
600		12.9	100	110	1410	830	46	44	43
Bulls - growth and maintenance (moderate activity)									
300	1	8.8	70-75	85	900	550	27	23	34
400	0.9	11	70-75	105	1030	620	23	23	43
500	0.7	12.2	80-85	113	1070	620	22	22	48
600	0.5	12	80-85	110	1020	600	22	22	48
700	0.3	12.9	90-100	116	1080	600	23	23	50
800	0	10.5	100	88	890	500	19	19	41
900	0	11.4	100	96	990	550	21	21	44
1000	0	12.4	100	104	1050	600	22	22	48

Minimum DM consumption is based on the general type of diet indicated in the roughage column.

Approximately 0.4 kg of weight gain over the last third of pregnancy is accounted for by the products of conception Avg milking ability = 5 kg per day, Superior milking ability = 10 kg per day Roughage = good quality roughage containing at least 8 MJ ME/kg

Mineral requirements and maximum tolerable levels of minerals for beef cattle

	Mean	Range	Maximum tolerable level
Calcium %	Table 3 & 4	0.18 to 0.53	2
Magnesium %	0.10	0.05 to 0.25	0.40
Phosphorus %	Table 3 & 4	0.18 to 0.37	1
Potassium %	0.65	0.5 to 0.7	3
Sodium %	0.08	0.06 to 0.10	10
Sulphur %	0.10	0.08 to 0.15	0.4
Cobalt mg/kg	0.10	0.07 to 0.11	5
Copper mg/kg	8	4 to 10	115
Iodine mg/kg	0.5	0.20 to 2.0	50
Iron mg/kg	50	50 to 100	1000
Manganese mg/kg	40	20 to 40	1000
Selenium mg/kg	0.1	0.05 to 0.30	2
Zinc mg/kg	30	20 to 40	500