

Errata

NOTE: For errata and software updates please visit <https://nap.nationalacademies.org/catalog/25806> and click on the Resources tab.

The following updates were made to *Nutrient Requirements of Dairy Cattle: Eighth Revised Edition*.

Page 74, After the sentence “The CCC was 0.52 and 0.50 for the fit and cross-validation, respectively.” the following clarifying text was added:

Because Equation 6-3 has an intercept (i.e., 101), the maximum predicted MCP is equal to RDP supply. Research is needed to improve estimation of MCP for heifers and dry cows, which have much lower intakes of RDP than lactating cows.

Page 106, Equation 7-2, the negative sign before 0.22 in $\text{MatBW}^{-0.22}$ was deleted to read:

$$\text{Ca, g/d} = ((9.83 \times \text{MatBW}^{0.22}) \times \text{BW}^{-0.22}) \times \text{ADG}$$

(Equation 7-2)

Page 219, The values presented in **Table 10-10** are incorrect because an incorrect coefficient was used to calculate the energy requirements, which made both the energy and protein values erroneous. A revised version of the table is shown below. Incorrect values have been replaced with values in boldface font.

TABLE 10-10 Daily Energy and Protein Requirements of Weaned Large- or Small-Breed Calves Fed Only Solid Feeds

BW (kg)	ADG (g/d)	DMI ^a (kg/d)	ME (Mcal/d)	NEm (Mcal/d)	MP (g/d)	CP (g/d)	CP (% of DMI)
55	400	1.465	4.394	1.734	174.3	249.0	17.0
	600	1.768	5.305	1.734	227.9	325.6	18.4
	800	2.083	6.248	1.734	281.6	402.3	19.3
65	400	1.607	4.820	1.966	183.1	261.6	16.3
	600	1.921	5.763	1.966	237.7	339.6	17.7
	800	2.246	6.739	1.966	292.5	417.9	18.6
75	400	1.742	5.226	2.188	191.5	273.6	15.7
	600	2.066	6.197	2.188	247.2	353.1	17.1
	800	2.401	7.202	2.188	303.0	432.9	18.0
85	600	2.204	6.612	2.404	251.2	358.8	16.3
	800	2.548	7.643	2.404	306.5	437.9	17.2
	1,000	2.900	8.700	2.404	362.0	517.1	17.8
95	600	2.337	7.010	2.613	259.4	370.5	15.9
	800	2.688	8.065	2.613	315.5	450.7	16.8
	1,000	3.049	9.146	2.613	371.7	531.0	17.4
105	600	2.465	7.394	2.817	267.3	381.9	15.5
	800	2.824	8.471	2.817	324.2	463.1	16.4
	1,000	3.192	9.575	2.817	381.2	544.6	17.1
	1,200	3.567	10.701	2.817	438.4	626.3	17.6
115	600	2.589	7.766	3.015	275.1	393.0	15.2
	800	2.954	8.863	3.015	332.8	475.4	16.1
	1,000	3.329	9.988	3.015	390.6	558.0	16.8
	1,200	3.712	11.136	3.015	448.6	640.8	17.3
125	600	2.709	8.128	3.210	282.7	403.9	14.9
	800	3.081	9.244	3.210	341.2	487.4	15.8
	1,000	3.463	10.388	3.210	399.8	571.1	16.5
	1,200	3.852	11.556	3.210	458.6	655.1	17.0
	1,400	4.248	12.743	3.210	517.4	739.2	17.4

^aAssumes starter contains 3.0 Mcal ME/kg DM.

Page 262, Equation 11-12b was corrected.

$$\text{ADG (kg/d)} = \text{RE} / (0.85 \times (1.74 + 3.08 \times (\text{BW}/\text{MatBW})) \times (0.0012 \times \text{MatBW}^{0.1})^{1/1.1})$$

(Old Equation 11-12b)

$$\text{ADG (kg/d)} = [\text{RE} / (0.85 \times (1.74 + 3.08 \times (\text{BW}/\text{MatBW})) \times (\text{MatBW}/700)^{0.1})]^{(1.0/1.1)}$$

(New Equation 11-12b)

Page 420, Three items in the model that were inadvertently excluded were added after item 38:

39. A vector of target AA and MP post-absorptive use efficiencies (Eff; range of 0 to 1 for each)
40. A switch denoting the effects of an under-developed rumen in a milk-fed calf on diet digestibility (*RumDevDisc_Clf* = 0 for developed and 1 for under-developed)
41. A switch denoting the use of non-milk based protein sources in milk replacers (*NonMilkCP_ClfLiq* = 0 for all milk proteins and 1 for use of other protein sources)

Page 421, At the top part of Equation 20-4, +79.3 × $An_Age_{DryFdStart} / 7$ was changed to +73.3 × $An_Age_{DryFdStart} / 7$

At the bottom part of Equation 20-4, +9.51 × $An_BW - 130.4$ was changed to +9.95 × $An_BW - 130.4$

Page 423, In three places in Equation 20-22, *NDF* was replaced with *ForNDF*

$$\begin{aligned} Dt_DMIn_Lact2 &= 12.0 - 0.107 \\ kgl &\times Dt_fNDF + 8.17 \\ &\times \frac{Dt_ADF}{Dt_NDF} + 0.0253 \\ &\times ForNDF48_NDF - 0.328 \\ &\times (Dt_ADF / Dt_NDF - 0.602) \\ &\times (ForNDF48_NDF - 48.3) \\ &+ 0.225 \times Milk_Prod_{Target} + 0.00390 \\ &\times (ForNDF48_NDF - 48.3) \\ &\times (Milk_Prod_{Target} - 33.1) \end{aligned}$$

(Old Equation 20-22)

$$\begin{aligned}
 Dt_DMIn_Lact2 &= 12.0 - 0.107 \\
 \text{kg/d} &\times Dt_fNDF + 8.17 \\
 &\times \frac{Dt_ADF}{Dt_NDF} + 0.0253 \\
 &\times ForNDF48_ForNDF - 0.328 \\
 &\times (Dt_ADF / Dt_NDF - 0.602) \\
 &\times (ForNDF48_ForNDF - 48.3) \\
 &+ 0.225 \times Milk_Prod_{Target} + 0.00390 \\
 &\times (ForNDF48_ForNDF - 48.3) \\
 &\times (Milk_Prod_{Target} - 33.1)
 \end{aligned}$$

(New Equation 20-22)

Page 424, The section heading Dietary Nutrient Concentrations and Intake Feed Nutrients was changed to **Dietary Nutrient Concentrations and Intake of Feed Nutrients**

Page 428, Clarifying text was added after the sentence ending with “0.824 g of TP/g of CP.” to read:

Microbial N flow is converted to CP and true protein (TP) flows (g/d) using static stoichiometric coefficients of 6.25 g of CP/g of N and 0.824 g of TP/g of CP. **Maximum microbial CP was set at RDP intake.**

Text referring to Table 6-5 “(g/100 g; Table 6-5 in Chapter 6)” was changed to “(g/100 g; **Table 6-2** in Chapter 6)”

Page 432, Equation 20-136 (top part under Value): $An_TPIn - Fe_CPout$ was changed to $An_TPIn - Fe_CPout + Fe_CPend$

Equation 20-138, Top part (under Criteria column): $An_StatePhs = "Calf"$ was changed to $An_StatePhs = "Calf"$ & $An_CPIIn_{cflLiq} > 0$

Top part (under Value column): $+Fe_INfCP$ was deleted

Bottom part (under Value column): $+Fe_EndCP$ was replaced with $+Fe_CPend$

Page 433, The sentence “where Dt_CPIIn was 95 percent digested for liquid feeds and 25 percent digested for dry feeds fed to calves.” was revised to read:

where Dt_CPIIn was 95 percent digested for liquid feeds and **75 percent** digested for dry feeds fed to calves.

Below Equation 20-139, the sentence “where Fe_EndCP (kg/d) was predicted as described in Chapter 6:” was deleted.

Equation 20-140 was corrected.

$$\begin{aligned}
 Fe_EndCP &= (12.0 + 0.12 \times An_NDF) \\
 \text{kg/d} &\times \frac{(Dt_DMIn + InfRum_DMIn + InfSI_DMIn)}{1,000}
 \end{aligned}$$

(Old Equation 20-140)

$$\begin{aligned}
 Fe_CPend_LiqFd &= \\
 \text{kg/d} &
 \end{aligned}$$

Criteria	Equation
$NonMilkCP_CflLiq = 0$	$0.0119 \times Dt_DMIn_{LiqFd}$
$NonMilkCP_CflLiq = 1$	$0.0344 \times Dt_DMIn_{LiqFd}$

$$\begin{aligned}
 Fe_CPend_DryFd &= \\
 \text{kg/d} &
 \end{aligned}$$

Criteria	Equation
$An_PhysState = "Calf"$	$0.0206 \times Dt_DMIn_{DryFd}$
$An_PhysState \neq "Calf"$	$12.0 + 0.12 \times An_NDF$ $\times (Dt_DMIn + InfRum_DMIn + InfSI_DMIn)$

$$Fe_CPend = Fe_CPend_LiqFd + Fe_CPend_DryFd \text{ kg/d}$$

(New Equation 20-140)

Below Equation 20-140, the sentence “ Fe_EndCP was arbitrarily assigned to An_RDP and An_RDP to provide an approximation of the contributions of each to endogenous secretions” was revised to read:

Fe_CPend was arbitrarily assigned to An_RDP and An_RDP to provide an approximation of the contributions of each to endogenous secretions.

Equation 20-141 and **Equation 20-142**: Fe_EndCP (at the right side of the equation) was replaced with Fe_CPend

Page 434, The phrase “except for liquid feeds” was deleted from the sentence “All ingredients in the concentrate feed category except for liquid feeds use a digestibility of 81 percent regardless of the library entry when $An_StatePhys$ is set to calf.” and was revised to read:

All ingredients in the concentrate feed category use a digestibility of 81 percent regardless of the library entry when $An_StatePhys$ is set to calf.

Below Equation 20-161d, the word “of” was deleted from the sentence “However, only total FA digestibility information is output because of biohydrogenation is not modeled” to read:

However, only total FA digestibility information is output because biohydrogenation is not modeled.

Page 435, For clarity the word “nutrient” was inserted in the sentence “GE supply (Mcal/d) and dietary concentration (Mcal/kg) of GE are calculated from total intakes and the heats of combustion for each nutrient (see Table 20-9)” to read:

GE supply (Mcal/d) and dietary concentration (Mcal/kg) of GE are calculated from total **nutrient** intakes and the heats of combustion for each nutrient (see Table 20-9):

Page 439, Equation 20-207 in the parentheses “1 –” was deleted after (and “– 1” was added before).

Page 441, A sentence that clarifies the limits of the equation was added after the sentence “and *Abs_Ile_g* and *Abs_Met_g* represented absorbed Ile and Met (g/d), respectively.” to read:

and *Abs_Ile_g* and *Abs_Met_g* represented absorbed Ile and Met (g/d), respectively. ***An_LactDay* was capped at a maximum of 375 d reflecting the general range of the data used for derivation of the equation.**

For clarity, a sentence was added in the paragraph right below Equation 20-216 to read:

where *Milk_NP* and *Milk_Fat* were as predicted above (kg/d); *An_LactDay* and *An_BW* were centered to the mean of 137 days and 612 kg, respectively; and *An_Parity* was represented as a continuous variable reflecting the animal state or the pen average with 1 for primiparous animals and 2 for multiparous animals. **Maximum *An_LactDay* was set at 375 d.** The predicted volume of milk produced represents the base breed of Holstein.

Page 445, Equation 20-255: An error in the equation was fixed. On the left side of the equation, *CPgain_* was replaced with *NPgain_*

$$NPgain_FrmGain = \left(0.201 - 0.081 \times \frac{An_BW}{An_BW_{Mature}} \right) \times 0.85 \times 0.86$$

(Equation 20-255)

Equation 20-256: Errors in the equation were fixed. On the left side of the equation *CPgain_* was replaced with *NPgain_* and on the right side of the equation =0.068 was changed to = **0.068 × 0.86** to reflect what is in the text.

Equation 20-258: Corrections were made on the right side of the equation. The variable *FrmNP_* was changed to *NPgain_* and *RsrvNP_* was changed to *NPgain_*

$$Body_NPGain \text{ kg/d} = NPgain_FrmGain \times Frm_Gain + NPgain_RsrvGain \times Rsrv_Gain$$

(Equation 20-258)

Page 446, For accuracy and clarity, **the sentence below Equation 20-265** “The conversion of ME to NEL for support of maintenance, growth, and lactation (*Km_ME_NE*, *Kg_ME_NE*, and *Kl_ME_NE*, Mcal/Mcal) is equal and defined as” was revised to read:

The conversion of ME to NEL for support of **maintenance and lactation (*Km_ME_NE* and *Kl_ME_NE*, Mcal/Mcal) were set to 0.66. The efficiency of conversion of ME to RE for frame gain (*Kf_ME_RE*) was defined as**

Equation 20-266 was corrected.

$$\left(\begin{matrix} Km_{ME_NEL} \\ Kg_{ME_NEL} \\ Kl_{ME_NEL} \end{matrix} \right) = \text{Mcal/Mcal}$$

Criteria	Value
$An_BW \leq 0.16$ $\times An_BW_{Mature}$	An_REGain $(1.1376 \times Dt_MEIn)$ $- (0.1198 \times Dt_MEIn^2)$ $+ (0.0076 \times Dt_MEIn^3) - 1.2979$
$An_BW > 0.16$ $\times An_BW_{Mature}$	0.63
$Parity > 0$ & $Milk_Prod > 0$	0.66
$Parity > 0$ & $Milk_Prod = 0$	0.66

(Old Equation 20-266)

$$Kf_{ME_RE} = \text{Mcal} / \text{Mcal} =$$

Criteria	Value
$An_StatePhys = \text{"Calf"}$	$(0.56 \times Dt_DMIn_{CflLiq}) + (1.1376 \times (An_DE \times 0.93) \times Dt_DMIn_{CflLiq} / Dt_DMIn) + (- (0.1198 \times (An_DE \times 0.93) + (0.0076 \times (An_DE \times 0.93) - 1.2979) / (An_DE \times 0.93) \times Dt_DMIn_{CflDry} / Dt_DMIn)$
$An_BW > 0.16 \times An_BW_{Mature}$	0.63
$Parity > 0 \ \& \ Mlk_Prod > 0$	0.66
$Parity > 0 \ \& \ Mlk_Prod = 0$	0.66

(New Equation 20-266)

The sentence below Equation 20-266 “The overall efficiencies of conversion of ME to RE were calculated as the product of the Kg_{ME_NEL} and Kg_{NEL_RE} efficiencies:” was revised to read:

The efficiency of conversion of ME to RE in support of reserve gains (Kr_{ME_RE}) was:

Equation 20-267 the right side of the equation was corrected.

$$Kg_{ME_RE} = Kg_{ME_NEL} \times Kg_{NEL_RE} = \text{Mcal} / \text{Mcal} =$$

Criteria	Value
$An_BW \leq 0.16 \times An_BW$	Variable
$An_BW > 0.16 \times An_BW_{Mature}$	0.56
$Parity > 0 \ \& \ An_MilkProd > 0$	0.74
$Parity > 0 \ \& \ An_MilkProd = 0$	0.59

(Old Equation 20-267)

$$Kr_{ME_RE} = \text{Mcal} / \text{Mcal} =$$

Criteria	Value
$An_BW > 0.16 \times An_BW_{Mature}$ and $An_MilkProd = 0$	0.60
$An_MilkProd > 0$ and $Rsrv_Gain > 0$	0.75
0.86 $An_MilkProd > 0$ and $Rsrv_Gain < 0$	0.89

(New Equation 20-267)

For clarity, above Equation 20-268 text was added before the sentence “ME required for NE gain (An_MEgain , Mcal/d) is calculated as” to read:

The overall conversion efficiency for ME to RE is thus the weighted average of Kf_{ME_RE} and Kr_{ME_RE} . ME required for NE gain (An_MEgain , Mcal/d) is calculated as

Equation 20-268 was corrected.

$$\text{Body_MEuse} = \frac{An_NEGain}{Kg_{ME_RE}} \text{Mcal/d} \quad (\text{Old Equation 20-268})$$

$$\text{Body_MEuse} = \frac{An_NEGain_{Rsrv}}{Kr_{ME_RE}} + \frac{An_NEGain_{Frm}}{Kf_{ME_RE}} \text{Mcal/d} \quad (\text{New Equation 20-268})$$

Equation 20-269: An error in the equation was fixed. On the right side of the equation the numerator was changed from An_NEGain to $An_NEGain_{Frm} + An_NEGain_{Rsrv}$.

Equation 20-271 was corrected.

$$Kg_{MP_NP} = \text{g/g} =$$

Criteria	Value
$An_StatePhys = \text{Calf}$	$0.70 - 0.532 \times (An_BW / An_BW_{mature}) \times Body_NP_CP$
$An_Parity = 0$ and $An_BW_empty / An_BW_{mature_empty}$	$0.64 - 0.3 \times (An_EBW / An_EBW_{mature}) \times Body_NP_CP$
$An_Parity > 0$	0.60

(Old Equation 20-271)

$$Kg_{MP_NP} = \text{g/g} =$$

Criteria	Value
$An_StatePhys = \text{Calf}$	$0.70 - 0.532 \times (An_BW / An_BW_{mature}) \times \mathbf{0.86}$
$An_Parity = 0$ and $An_BW_empty / An_BW_{mature_empty} > \mathbf{0.12}$	$0.64 - 0.3 \times (An_EBW / An_EBW_{mature}) \times \mathbf{0.86}$
$An_Parity > 0$	$Trg_MP_NP \times \mathbf{0.86}$

(New Equation 20-271)

Page 447, Equation 20-272: Erroneous values were corrected. Under the Value column, 0.072 was changed to **0.0769** and 0.082 was changed to **0.097**.

$$\frac{An_NEmUse_{NS}}{Mcal/d} =$$

Criteria	Value
Calves: $Dt_DMIn_{LiquidFeed} > 0$	$0.0769 \times An_EBW^{0.75}$
Calves: $Dt_DMIn_{LiquidFeed} = 0$	$0.097 \times An_BW^{0.75}$
Heifers: $Dt_DMIn_{Milk} = 0$ & $Parity = 0$	$0.10 \times An_BW^{0.75}$
Cows: $Parity > 0$	$0.10 \times An_BW_{NPr,3}^{0.75}$

(Equation 20-272)

Page 448, Equation 20-282 was corrected.

$$\frac{Km_{ME_NE}}{Mcal/Mcal} =$$

Criteria	Value
$An_BW \leq 100$	$\frac{Km_{ME_NE(ClfLiq)}}{An_DMIn_{Liq}} \times \frac{An_DMIn_{Liq}}{An_DMIn} + \frac{Km_{ME_NE(ClfDry)}}{An_DMIn_{CfLiq}} \times \frac{An_DMIn_{CfLiq}}{An_DMIn}$
$An_StatePhys \neq \text{"Calf"}$ & $An_Parity = 0$	0.63
$An_Parity > 0$	0.66

(Old Equation 20-282)

$$\frac{Km_{ME_NE}}{Mcal/Mcal} =$$

Criteria	Value
$An_StatePhys = \text{"Calf"}$ and $An_ME_{CfDry} > 0$ and $Dt_DMIn_{CfLiq} = 0$	Km_{NE}
$An_StatePhys = \text{"Calf"}$ and $Dt_DMIn_{CfLiq} = 0$	0.69
$An_StatePhys \neq \text{"Calf"}$ & $An_Parity = 0$	0.63
$An_Parity > 0$	0.66

(New Equation 20-282)

Page 449, Equation 20-295 was corrected.

$$\frac{Ur_NPend_g}{g/d} = Ur_Nend_g \times 6.25$$

(Old Equation 20-295)

$$\frac{Ur_NPend_g}{g/d} =$$

Criteria	Equation
$An_StatePhys = \text{"Calf"}$	$2.75 \times An_BW^{0.50}$
$An_StatePhys \neq \text{"Calf"}$	$Ur_Nend_g \times 6.25$

(New Equation 20-295)

Equation 20-298 on the right side of the equation in the numerator Ur_ND_g was changed to Ur_EAAend_g .

The sentence below Equation 20-299 “NP loss as fecal endogenous (Fe_NPend , g/d; also referred to as metabolic fecal) is defined from dietary NDF concentrations and DMIn as” was changed to:

NP loss as fecal endogenous (Fe_Nend , g/d; and Fe_NPend , g/d; also referred to as metabolic fecal) are defined from dietary NDF concentrations and DMIn as

Page 450, Equation 20-307: Under the Value column, $_CfDry \times 0.93$ was changed to $_CfDry \times K_DE_ME_{CfDry}$.

Text was added to the sentence right below Equation 20-307 “where $An_DEI\ n_base$ = the DE unadjusted for DMIn” to read:

where $An_DEI\ n_base$ = the DE unadjusted for DMIn and $K_DE_ME_{CfDry}$ is the efficiency of conversion of DE to ME.

Below this text, a new un-numbered equation was added:

$$K_DE_ME_{CfDry} =$$

mcal/mcal

Criteria	Equation
$An_StatePhys = \text{"Calf"}$ and $Dt_DMIn_{CfLiq} > 0.015 \times An_BW$ and $RumDevDisc_Cf = 1$	0.93
$An_StatePhys = \text{"Calf"}$ and $RumDevDisc_Cf = 1$	0.93×0.90

Equation 20-310: An error in a variable under the Value column was fixed. The variable *AnGEIn* was changed to *An_GEIn*.

Page 452, For clarity, a revision was made in the **sentence right below Equation 20-342** “Output of the macro-and microminerals with predictions for absorption in manure was calculated by difference from dietary intakes” to read:

Manure output of the macro-and microminerals with predictions for absorption was calculated by difference from dietary intakes

Page 454, For clarity, this sentence was added right **above Equation 20-363:**

The efficiencies of individual absorbed EAA use for export protein plus retained in body protein are calculated for comparison to the target efficiencies listed in Chapter 6.

For clarity, a sentence was added right **above Equation 20-372 (or right below Equation 20-371):**

Calcium required by calves consuming liquid feed is calculated as

Page 469, Additional information about the software was added to the last sentence **right before the References** section to read:

The model code and scripts to run the five observations are provided at the National Academies Press website (see <https://www.nap.edu/catalog/25806>) **and in the C:\NASEM\NASEM-Dairy-8\script folder after installation of the software.**

Page 471, In **Table 21-1** the vitamin E values for growing calves and heifer ages 225, 350, 475, and 600 days are incorrect due to a mistake in converting pounds to kilograms. A revised section of the table is shown below. Incorrect vitamin E values (56, 62, 68, and 77) have been replaced with the correct values (in boldface font).

TABLE 21-1 Predicted Nutrient Concentrations (DM Basis) Needed to Meet the Nutrient Requirements for Holstein Cattle at Varying Stages of Lactation and Ages of Maturity

	Growing Calves and Heifers						Lactating Cows by Parity (Body Weight) and Days in Milk ^a					
	Dry Cows ^a			Days in-Milk			First (570 kg)			Mature (700 kg)		
	60-21d1	<21d	Days Prepartum	Milk, kg	Fat %	Protein %	15	150	20	100	200	
Age, days	30	100	225	350	475	600	33	39	53	55	43	
BW, kg	65	120	230	330	420	530	3.9	3.6	3.7	3.5	3.8	
Growth Rate, kg/d	0.7	0.7	0.9	0.8	0.7	0.9	0.1	0.1	0.1	0.1	0.1	
Dry matter intake, kg/d	1.4	3.9	6.6	8.5	9.8	11.0	13.9	12.3	20.8	23.9	25.8	
ME, Mcal/kg	3.68	2.26	2.09	1.95	1.92	2.12	1.93	2.25	2.39	2.61	2.73	
NE _L , Mcal/kg	—	—	—	—	—	—	1.28	1.49	1.58	1.72	1.80	
Rumen-degradable protein, %	—	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Rumen-undegradable protein, %	—	6.6	4.4	2.6	1.7	2.7	1.9	4.3	6.2	7.0	7.5	
Crude protein, %	21.0	16.6	14.4	12.6	11.7	12.7	11.9	14.3	16.2	16.0	17.4	
Metabolizable protein, %	16.5	9.5	8.1	6.8	6.1	14.0	5.2	6.7	9.8	9.8	10.1	
NDF, min %	—	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	
Forage NDF, min %	—	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	
Starch max, % (varies)	—	15-20	15-20	15-20	15-20	15-20	15-20	15-20	22-30	22-30	22-30	
Macrominerals, %												
Ca	0.59	0.78	0.58	0.44	0.37	0.39	0.31	0.39	0.57	0.57	0.64	
P	0.45	0.32	0.26	0.21	0.18	0.19	0.19	0.21	0.35	0.35	0.37	
Mg	0.15	0.14	0.12	0.12	0.12	0.10	0.13	0.14	0.17	0.17	0.18	
K	1.00	0.51	0.52	0.54	0.56	0.60	0.62	0.69	1.03	0.97	1.10	
Na	0.35	0.17	0.16	0.16	0.15	0.16	0.16	0.17	0.21	0.21	0.23	
Cl	0.28	0.14	0.14	0.13	0.13	0.13	0.13	0.14	0.29	0.30	0.34	
S	—	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
DCAD-S mEq/kg min	—	39	42	45	50	60	66	-100	148	130	135	
Trace minerals, mg/kg												
Cu	5	16	16	15	15	17	18	19	9	8	10	
Co	—	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
I	0.78	0.69	0.58	0.54	0.53	0.54	0.51	0.54	0.46	0.42	0.41	
Fe	90	61	46	32	24	28	13	15	16	16	16	
Mn	50	49	44	40	38	43	38	43	28	26	27	
Se	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Zn	70	47	41	36	34	35	30	32	57	58	61	
Vitamins, IU/kg												
Vitamin A	5,218	3,390	3,829	4,265	4,698	5,288	5,850	6,630	3,021	2,796	3,303	
Vitamin D	1,518	924	1,044	1,163	1,281	1,442	1,595	1,810	1,099	954	1,021	
Vitamin E	86	49	25	28	31	35	85	181	22	19	20	

^aEnergy and protein requirements for dry and lactating cows have been adjusted for growth (0.19 and 0.1 kg/d) for first versus mature cows and changes in energy reserves (-0.36, -1.00, 0.20, -1.70, 0.21, and 0.21 kg/d) for the respective groups beginning with dry cows at less than 21 days prepartum. Days pregnant were set at 10, 60, and 110 for cows at 100, 150, and 200 DIM.

Page 472, In **Table 21-2** the vitamin E values for growing calves and heifer ages 225, 350, 475, and 600 days are incorrect due to a mistake in converting pounds to kilograms. A revised section of the table is shown below. Incorrect vitamin E values (54, 61, 67, and 77) have been replaced with the correct values (in boldface font).

TABLE 21-2 Predicted Nutrient Concentrations (DM Basis) Needed to Meet the Nutrient Requirements for Jersey Cattle at Varying Stages of Lactation and Ages of Maturity

	Growing Calves and Heifers										Dry Cows ^a						Lactating Cows by Parity (Body Weight) and Days in Milk ^a					
	100		90		350		475		600		Days Prepartum		Days in Milk		First (425 kg)		Mature (520 kg)					
	30	45	100	90	225	175	350	475	600	60-21d1	<21d	15	22	15	27	150	20	100	200			
Age, days	30	45	100	90	225	175	350	475	600	60-21d1	<21d	15	22	15	27	150	20	100	200			
BW, kg	45	90	100	90	175	175	245	310	400	555	555	4.9	4.9	4.9	4.9	5.0	4.8	4.8	4.8			
Growth Rate, kg/d	0.5	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.06	0.06	3.9	3.9	3.7	3.7	3.5	3.5	3.5	3.7			
Dry matter intake, kg/d	1.0	3.0	3.0	5.1	5.1	7.4	6.5	7.4	8.3	10.4	9.4	16.5	16.5	19.4	20.5	20.5	23.5	21.9	21.9			
ME, Mcal/kg	3.69	2.41	2.41	2.16	2.16	2.02	2.02	2.13	2.25	2.04	2.19	2.41	2.41	2.72	2.67	2.67	2.80	2.68	2.68			
NE _L , Mcal/kg	—	—	—	—	—	—	—	—	—	1.36	1.44	1.59	1.59	1.79	1.76	1.76	1.85	1.78	1.78			
Rumen-degradable protein, %	—	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0			
Rumen-undegradable protein, %	—	7.8	4.4	3.1	3.1	3.1	3.1	3.1	2.9	1.8	3.7	6.8	6.8	7.6	8.0	8.0	8.0	7.6	7.6			
Crude protein, %	22.9	17.8	17.8	14.4	14.4	13.1	13.1	13.1	12.9	11.8	13.7	16.8	16.8	17.6	18	18	18	17.6	17.6			
Metabolizable protein, %	18.2	10.6	10.6	8.2	8.2	7.2	7.2	6.9	6.6	5.5	6.1	10.2	10.2	10.0	11.1	11.1	10.5	10.2	10.2			
NDF, min %	—	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33			
Forage NDF, min %	—	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25	19-25			
Starch max, % (varies)	—	15-20	15-20	15-20	15-20	15-20	15-20	15-20	15-20	15-20	15-20	22-30	22-30	22-30	22-30	22-30	22-30	22-30	22-30			
Macrominerals, %																						
Ca	0.75	0.84	0.84	0.58	0.58	0.44	0.44	0.43	0.39	0.31	0.38	0.56	0.56	0.56	0.63	0.63	0.60	0.57	0.57			
P	0.55	0.34	0.34	0.26	0.26	0.21	0.21	0.20	0.19	0.21	0.23	0.33	0.33	0.34	0.37	0.37	0.35	0.34	0.34			
Mg	0.15	0.14	0.14	0.12	0.12	0.12	0.12	0.12	0.10	0.13	0.14	0.16	0.16	0.16	0.17	0.17	0.17	0.16	0.16			
K	1.20	0.50	0.50	0.52	0.52	0.53	0.53	0.56	0.60	0.62	0.68	0.96	0.96	0.89	1.01	1.01	0.92	0.93	0.93			
Na	0.43	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.20	0.20	0.20	0.21	0.21	0.21	0.20	0.20			
Cl	0.34	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.14	0.27	0.27	0.27	0.31	0.31	0.29	0.27	0.27			
S	—	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
DCAD-S, mEq/kg min	—	39	39	40	40	43	43	50	60	66	-100	133	133	114	140	140	119	124	124			
Trace minerals, mg/kg																						
Cu	6	17	17	15	15	15	15	16	17	18	19	9	9	8	9	8	8	8	8			
Co	—	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
I	1.08	0.77	0.77	0.64	0.64	0.61	0.61	0.60	0.61	0.58	0.62	0.45	0.45	0.41	0.46	0.46	0.41	0.41	0.41			
Fe	110	68	68	46	46	32	32	32	29	13	15	13	13	14	17	17	16	14	14			
Mn	60	52	52	44	44	39	39	42	44	38	43	25	25	23	28	28	25	25	25			
Se	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3			
Zn	84	49	49	41	41	36	36	36	35	30	32	53	53	54	59	59	56	53	53			
Vitamins, IU/kg																						
Vitamin A	6,084	3,286	3,286	3,745	3,745	4,162	4,162	4,592	5,273	5,850	6,510	2,836	2,836	2,405	2,796	2,796	2,520	2,616	2,616			
Vitamin D	1,770	896	896	1,021	1,021	1,135	1,135	1,252	1,438	1,595	1,774	1,031	1,031	875	1,017	1,017	884	951	951			
Vitamin E	90	48	48	25	25	28	28	30	35	85	177	21	21	17	20	20	18	19	19			

^aEnergy and protein requirements for dry and lactating cows have been adjusted for growth (0.14 and 0.06 kg/d) for first versus mature cows and changes in energy reserves (-0.24, -0.75, 0.15, -1.28, 0.16, and 0.16 kg/d) for the respective groups beginning with dry cows at less than 21 days prepartum. Days pregnant were set at 10, 60, and 110 for cows at 100, 150, and 200 DIM.

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