

## NUTRIENT RECOMMENDATIONS FOR DRY AND LACTATING HOLSTEIN COWS

Authors: T. R. Overton, M. E. Van Amburgh, and L. E. Chase, Cornell University

Updated 3/2018

Item	Units	Far-off Cows	Close-up Cows	Fresh Cows	High Cows
<b>General</b>					
DMI	lb/d	28 - 30	27 - 29	42+	52+
DMI	kg/d	13 - 14	~ 13	19+	23+
ME (CNCPS 6.55)	Mcal/lb	0.80 to 0.90	0.90 to 1.0	~ 1.0 to 1.1	~ 1.1 to 1.2
ME (CNCPS 6.55)	Mcal/kg	1.8 to 2.0	2.1 to 2.2	~ 2.3	~ 2.4 to 2.6
ME balance	% of req.	100 to 120%	110 to 130%	80 - 90%	100 - 110%
<b>Protein</b>					
Crude protein	% DM	< 16	<15	<18	15 - 17%
Rumen NH3 balance (CNCPS 6.55)	%	<200%	<180%	110 - 150%	110 - 150%
Metabolizable protein	g/d	1000 - 1100	1200 - 1400	N/A	N/A
Metabolizable protein balance	% of req.	110 to 120%	110 to 120%	95 to 110%	100 to 110%
MP from bacteria (CNCPS 6.55)	% of MP	no guideline	>50%	> 40%	> 40%
MP allowable milk (CNCPS 6.55)	% of req.	N/A	N/A	90 - 105%	100 - 110%
Urea cost	Mcal/d	no guideline	< 0.5 Mcal	< 0.5 Mcal	< 0.5 Mcal
Methionine (CNCPS 6.55))	% of MP	no guideline	2.60 - 2.80%	2.60 - 2.80%	2.60 - 2.80%
Lysine (CNCPS 6.55)	% of MP	no guideline	6.80 - 7.00%	6.80 - 7.00%	6.80 - 7.00%
Methionine (CNCPS 6.55))	g AA / Mcal ME	no guideline	no guideline	~ 1.1	~ 1.1
Lysine (CNCPS 6.55)	g AA / Mcal ME	no guideline	no guideline	~ 3.0	~ 3.0

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<b>Carbohydrate</b>					
Forage NDF, optimum	% BW	0.7 - 0.8	0.6 - 0.7	0.8 to 0.9	0.9 - 1.0
peNDF	% DM	30 - 40	28 - 35	23 - 24	22 - 23
Total NDF	% DM	46 - 54	40 - 45	28 - 35	28 - 35
Starch	% DM	< 13	16 to 18	22 - 28	24 - 28
Sugar	% DM	<3	3 to 7%	4 to 7%	4 to 7%
NFC	% DM	20 - 30	30 - 34	35 - 42	35 - 42
<b>Fat</b>					
Total fat, optimum	% DM	3.5	3.5	4.0 to 4.5	4.5 to 5.0
Total fat, maximum	% DM	4.5	4.5	5.0 to 5.5	5.5 to 6.0
<b>Macrominerals</b>					
Calcium (Ca)*	% DM	0.5 - 0.7	0.9 - 1.1	0.9 - 1.0	0.70 - 0.80
Phosphorus (P)	% DM	0.3 - 0.35	0.3 - 0.35	0.35 - 0.42	0.35 - 0.40
Magnesium (Mg)	% DM	0.2 - 0.25	0.45 - 0.50	0.35 - 0.45	0.25 - 0.35
Potassium (K)	% DM	< 2.0	< 1.3	1.5 - 2.0	1.5 - 2.0
Sodium (Na)	% DM	< 0.10	< 0.10	0.3 - 0.6	0.25 - 0.4
Chloride (Cl)*	% DM	0.4 - 0.8	0.4 - 0.8	0.3 - 0.4	0.25 - 0.35
Sulfur (S)	% DM	0.3	0.3	0.20 - 0.25	0.20 - 0.25

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<b>Trace Elements</b>					
Selenium (Se)**	PPM	0.3	0.3	0.3	0.3
Cobalt (Co)	PPM	0.3	0.4	0.25 - 0.35	0.20 - 0.30
Iodine (I)	PPM	0.8	0.8	0.7 - 0.9	0.4 - 0.6
Copper (Cu) ***	PPM	15 - 20	15 - 20	15 - 20	15 - 20
Manganese (Mn) ***	PPM	60 - 80	60 - 80	50 - 60	40 - 50
Zinc (Zn) ***	PPM	60 - 80	60 - 80	70 - 80	55 - 70
Iron (Fe)****	PPM	50	50	50	50
<b>Vitamins</b>					
A	IU	75,000	75,000	75,000	75,000
D	IU	25,000	30,000	30,000 - 40,000	30,000 - 40,000
E	IU	500	1800	750	500

### NOTES:

\* If DCAD formulation in close-up diet, increase Ca to 1.4 to 1.5%, increase S to 0.35 to 0.45% and use S and Cl sources to titrate urine pH to as low as 5.5 to 6.0

\*\* FDA limit for added selenium (recommend improved sources if available for dry and fresh cows)

\*\*\* Total diet concentration (prefer use of improved sources)

\*\*\*\* Iron will generally not be added to the diet and diets will generally contain higher levels of iron than these (soil contamination)