

CNCPS Diet Formulation

Researchers at the University of Saskatchewan have demonstrated the value of the Cornell Net Carbohydrate and Protein System (CNCPS) in identifying production limitations and formulating diets for dairy cattle. Results of a trial comparing a TMR formulated using the conventional approach with one formulated using CNCPS are shown in the table on the right. The CNCPS diet cost 7.5% less, produced slightly more milk and allowed the cows to gain more weight during the 3 weeks they were fed that diet.

Accurate analysis of dietary ingredients is as important when using CNCPS as it is with conventional ration formulation. Although the CNCPS software (CPM Dairy) includes an extensive database of feed analyses, many are not representative of feeds used in Western Canada. The table below compares values in the CNCPS database with analyses done in the University of Saskatchewan feed lab.

source: D.A. Christensen et al., Proc West Nutr Conf 16:223 (1995)

Ingredient	Conventional Diet	CNCPS Diet
	----- kg -----	----- kg -----
Alfalfa Hay	4.45	3.49
Barley Silage	5.20	7.33
Barley Grain	6.59	6.28
Canola Meal	1.29	2.70
Soybean Meal	1.16	-
Dehy Alfalfa	1.86	0.91
Tallow	0.16	0.19
Beet Molasses	0.22	0.08
Oat Grain	0.58	-
Wheat Grain	0.40	-
Distillers Grains	0.51	1.84
Corn Gluten Meal	0.27	-
Minerals & Vitamins	0.56	0.65
Ingredient Cost ¹ , \$/day	3.44	3.19
Dry Matter Intake, kg/day	23.2	23.3
3.5% Fat Corr Milk, kg	34.7	34.9
Weight Gain, kg/day	0.21	0.67

¹based on December 1999 ingredient prices

	Alfalfa Hay mid-bloom		Barley Silage		Barley Grain		Canola Meal		Soybean Meal	
	CNCPS	SASK	CNCPS	SASK	CNCPS	SASK	CNCPS	SASK	CNCPS	SASK
CP, % of DM	22.0	16.1	10.4	11.8	13.0	11.6	42.3	36.0	54.0	51.2
NDF, % of DM	44.0	46.9	48.7	51.9	19.0	23.2	29.0	29.4	7.0	9.3
Lignin, % of NDF	22.7	17.2	5.4	8.8	10.5	3.5	12.8	29.4	3.0	5.2
Soluble CP, % of CP	28.0	37.5	70.0	91.4	17.0	27.6	32.4	28.6	20.0	29.9
NPN, % of Soluble CP	93.0	81.7	100.0	96.5	29.0	35.6	65.0	58.6	55.0	20.0
NDFIP, % of CP	25.0	17.6	7.7	6.3	8.0	15.1	10.6	16.5	10.0	5.2
ADFIP, % of CP	14.0	9.7	6.1	4.2	5.0	3.9	6.4	9.3	5.0	0.6
Starch, % of NSC	10.0	2.5	100.0	58.2	90.0	94.0	90.0	10.4	90.0	6.9
Fat, % of DM	3.2	2.5	3.0	3.7	2.1	2.3	1.2	6.6	1.0	1.6
Ash, % of DM	9.0	9.0	8.0	9.5	3.0	2.4	7.8	8.6	6.5	7.2
Protein Fractions, % of DM										
A instantaneous	5.7	4.9	7.3	10.4	0.6	1.1	8.9	6.0	5.9	3.1
B1 200-300 %/hr	0.4	1.1	0.0	0.4	1.6	2.1	4.8	4.3	4.9	12.3
B2 5-15 %/hr	10.3	7.2	2.3	0.3	9.8	6.7	24.1	19.8	37.8	33.2
B3 0.1-1.5 %/hr	2.4	1.3	0.2	0.2	0.4	1.3	1.8	2.6	2.7	2.4
C indigestible	3.1	1.6	0.6	0.5	0.7	0.5	2.7	3.3	2.7	0.3
Carbohydrate Fractions, % of DM										
A 100-350 %/hr	25.5	27.7	0.0	10.0	6.4	3.7	2.4	22.7	3.7	31.1
B1 10-60 %/hr	2.8	0.7	30.7	13.9	57.5	58.5	21.8	2.6	33.2	2.3
B2 2-10 %/hr	14.5	24.8	41.5	40.1	13.2	19.5	15.6	2.7	1.1	5.4
C indigestible	24.0	19.4	6.4	11.0	4.8	2.0	20.7	24.0	0.5	1.2

abbreviations: DM - Dry Matter; CP - Crude Protein; NDF - Neutral Detergent Fibre; NDFIP - Neutral Detergent Fibre Insoluble Protein; ADFIP - Acid Detergent Fibre Insoluble Protein; NSC - Non-Structural Carbohydrates