

Composition of Diets Fed to Different Groups of Lactating Cows on California Dairies

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INTRODUCTION

Feed ingredients and feeding management practices are important variables in managing profit on commercial dairy farms.

These variables may also have an important impact on complying with environmental regulations in California dairies.

Many different by-products from the Ag systems are being used as feed ingredients in dairy diets to produce milk and reducing possible pollution problems.

Quantitative and qualitative information of the most used feed ingredients, daily intakes, dietary nutrient contents and feeding management practices in lactating animals on commercial dairy systems are important in comparing, analyzing, planning, and making decisions for future improvements in the dairy industry.

OBJECTIVE

To describe TMR feed ingredients, nutrient contents, and feeding groups in lactating dairy cows on commercial California dairy farms.

METHODS

-Dairies Surveyed: A total of 40 dairies were visited in Merced County, CA. Herd size average was 787 lactating cows ranging from 210 to 2435. Milk yield averaged 31.8 kg at 3.5%FCM/cow per day ranging from 20.6 to 43.5 kg/cow/day.

-Information of TMR feed ingredients was obtained from the ration formulated by the nutritionist and/or the feeder loading sheets.

-Dry matter intake (DMI) was obtained from the ration formulated by the nutritionist. The DMI were not corrected by possible feed refusals. The NRC 2001 DM feed contents were used to adjust lacking or missing data.

-Nutrient composition (CP, NDF, ADF, Lig, Fat, Ash) of the TMR was evaluated by wet chemistry. Total mixed ration samples from the feed bunk for each feeding group were collected in duplicate on two non-consecutive days (3 to 7 days apart).

-Data analysis

Data is presented with descriptive statistics: mean, standard deviation (SD), minimum and maximum values.

Table 1 contains a list of the main feed ingredients used in California dairies and its dry matter intake.

From 118 TMR, 104 TMR were used with complete information of feed ingredients. The main feed ingredients used in more than 65% of the TMR were: corn silage (74% of TMR), alfalfa hay (98% of TMR), corn grain (84% of TMR), cotton seeds (72% of the TMR), and canola meal (65% of the TMR). All the other ingredients (about 20 different byproducts) were in less than 45% of the TMR.

The grouping systems and nutrient composition (n=118) of the TMR are presented in **Table 2**.

Nine of 40 dairies (22%) fed a single diet to all lactating cows and 31 dairies fed multiple TMR diets to their lactating cow groups. Average milk production per cow for dairies feeding a single diet and multiple diets were 27.5±5.5 and 33.0±4.5 kg/d 3.5% FCM.

All dairies with multiple diets had a high and low TMR, and 58, 32, and 15% of dairies with multiple diets prepared TMR for fresh, first lactation, and mid groups, respectively.

Average dietary NDF and fat content on dairies with one diet were close to the low TMR from dairies with multiple diets.

Crude Protein contents in multiple diets TMR (fresh, 1st lactation, high, and mid) were similar, averaging 17.5%CP. Across farms, CP content for 1st lactation diets were most consistent ranging from 16.7 to 18.0%CP, whereas for the other production groups ranged from 14% to more than 19%.

The **Figure 1** compare CP% of extreme multiple diets or low and high milk yield cow groups. The difference of CP% in the bottom 25% data distribution was less than 7% between low and high milk yield cows, with minimal (average) or no differences in the top 25% distribution data, with about 19%CP.

RESULTS

Table 1. TMR feed ingredients and Dry Matter Intakes (n=104 TMR)

Dry Matter Intake Feed ingredients	Mean	SD	Min	Max	n ^{1,4}
	-----kg/cow/day-----				
Silages					
Corn	6.00	1.86	2.18	10.68	77
Winter crops	3.92	2.05	0.55	8.59	45
Alfalfa	2.56	1.24	1.09	6.18	21
Ryegrass	2.31	1.48	1.36	5.36	12
Hays					
Alfalfa	4.26	1.34	0.95	9.09	102
Winter crops	0.59	0.34	0.06	1.45	34
Grains					
Corn	4.14	1.29	0.36	6.91	87
Barley	0.99	0.43	0.57	1.68	10
Byproducts					
Cotton seeds	1.59	0.51	0.64	2.91	75
Canola	1.93	0.69	0.50	4.05	68
DDG	1.65	0.82	0.05	4.64	45
Almond hulls	1.44	0.56	0.18	2.95	39
Soy hulls	1.21	0.53	0.23	2.45	31
Whey/permeate	1.24	1.29	0.32	4.55	29
Fat supplements ²	0.21	0.09	0.10	0.45	27
Soybean meal	0.97	0.63	0.09	2.23	25
Corn gluten	1.41	0.88	0.09	2.86	21
Molasses	0.47	0.13	0.30	0.68	19
Corn germ	2.22	1.27	0.23	4.95	18
Wheat mill byproducts	1.40	0.74	0.27	2.86	15
Rice bran	0.38	0.25	0.05	0.82	10
Mineral mixes					
Mineral & Vitamins ³	0.64	0.37	0.12	1.80	82

1. number of TMR including each feed ingredient (n=104 TMR)
 2. fat supplements in the mineral mixed could not be estimated
 3. dietary urea could not be calculated
 4. other feed ingredients included in less than 10 TMR were: grains screening, bakery wastes, WDG, sugar beet pulp, raisin tailings, tomatoes, copra chicken manure.

Table 2. TMR nutrient contents in lactating dairy cows feeding groups, means ± SD (n=118 TMR)

Nutrient contents	DM%	CP%	NDF%	ADF%	Lig	Fat%	Ash%
Dairies (n)							
Multiple diets	31						
Fresh	18	58.0±5.5	17.5±1.3	34.0±2.3	23.4±1.6	5.4±0.8	4.7±1.0 8.3±1.1
1st lactation	10	59.0±6.3	17.5±0.4	32.8±2.3	22.6±1.9	5.4±0.9	4.7±0.7 8.6±1.5
High	31	58.3±6.1	17.5±1.3	33.8±1.9	22.8±1.4	5.5±0.8	5.0±1.2 8.3±0.9
Mid	15	58.5±6.9	17.5±1.0	34.6±2.2	23.8±2.1	5.6±1.0	4.9±1.2 8.4±1.4
Low	31	54.9±7.3	16.9±1.6	36.1±3.0	24.5±2.6	6.0±1.3	4.0±0.9 8.7±1.3
Single diet	9	56.0±11.4	17.8±1.9	36.9±3.0	24.3±2.3	5.9±0.6	4.1±1.0 8.1±1.0

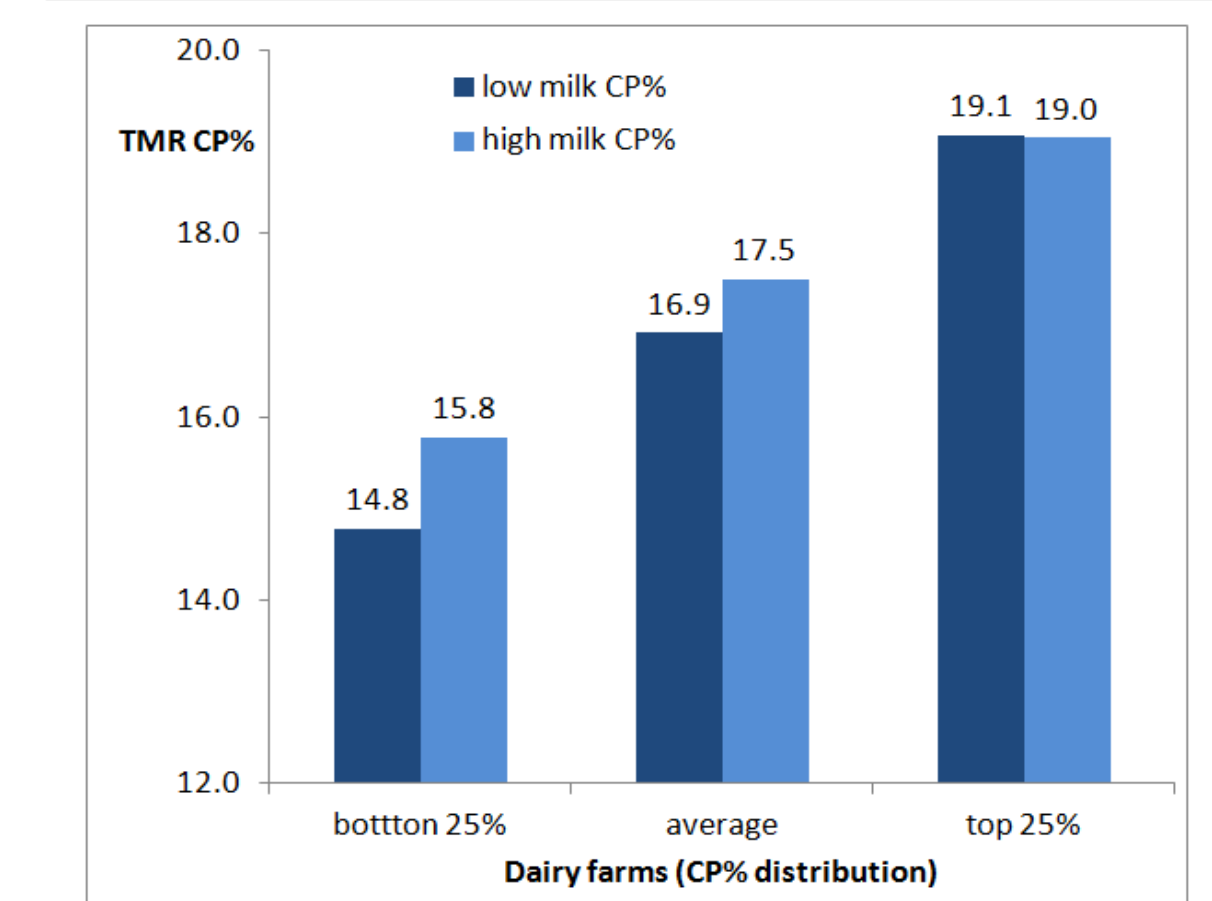


Figure 1. TMR CP% distribution of low and high milk yield cows in dairies with multiple diets.

CONCLUSIONS

The typical lactating dairy cow diet is based on five main ingredients (corn silage, alfalfa hay, corn grain, cotton seeds, and canola meal). More than twenty different by-products from the California Ag system, included in less than 45% of the TMR diets are being used to feed lactating cows and transformed in milk. About 80% of the dairies are using mineral mixes for lactating cows.

Based on the limited variation in average nutrient concentrations among different diet groups, opportunities may exist to better match cow requirements with TMR composition in dairy farms with single and multiple diets. Because of its impact on nitrogen excretion CP% should be particularly controlled.

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