

## SUMMARY

ROYAL CANIN Veterinary Diet<sup>TM/MC</sup> feline RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) are complete cat foods with restricted phosphorus levels and reduced protein and sodium content to aid in the dietary management of chronic renal failure in cats.

## INDICATIONS

- For the management of chronic renal failure in adult cats

## CONTRAINDICATIONS

- Growing kittens
- Pregnant or lactating queens

## NUTRITIONAL DIFFERENCES

(as compared to typical commercial pet foods)

- Highly restricted phosphorus content
- Restricted protein content
- High biological value protein
- High energy content (using non-protein sources)
- Moderately restricted sodium levels
- Enhanced potassium content
- Enhanced levels of B-vitamins
- Enriched with antioxidants

## RATIONALE

Dietary management of cats with chronic renal failure (CRF) is aimed at improving clinical symptoms, minimizing vitamin, mineral, and electrolyte imbalances, and slowing disease progression. In order to achieve these goals, levels of phosphorus, protein, potassium, sodium, B-complex vitamins, and fat have been modified in RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch).

**FELINE**

## Energy

In cats with chronic renal failure, it is important to provide sufficient energy to minimize catabolism of either dietary or endogenous protein. Protein catabolism contributes to the production of nitrogenous waste products and the clinical symptomatology of uremia.

Non-protein energy can be provided as either carbohydrate or fat. Fat is preferred for the patient with renal failure as it increases the energy density of the diet. This translates to less volume of food fed on a daily basis as compared with maintenance diets.

RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) are formulated with relatively high fat contents and high energy density.

## Protein

Cats with chronic renal failure have a reduced ability to excrete both nitrogenous and non-nitrogenous protein catabolites. The accumulation of these metabolic by-products in the circulation is one of the major causes of uremic symptoms and laboratory abnormalities with renal failure.

Clinical studies have shown that modifying dietary protein intake in the cat can reduce blood urea nitrogen (an index of nitrogenous waste products), as well as provide clinical benefits. In addition to reducing the level of nitrogenous waste products, protein restriction may also reduce the intake of dietary phosphorus. Protein restriction also decreases the renal solute load, thereby, lessening the severity of the polyuria and polydipsia.

## Minerals

Dietary phosphorus restriction has been shown to slow the progression of renal disease. Hyperphosphatemia is a common finding in chronic renal failure. Increased serum phosphorus concentrations lead to a decrease in the activity of the enzyme alpha-hydroxylase in the kidney, contributing to a decreased production of calcitriol and an increased production of parathyroid hormone.

Parathyroid hormone is considered a uremic toxin. It contributes to anemia, neurotoxicity, soft tissue calcification, and renal osteodystrophy. Phosphorus restriction decreases the production of parathyroid hormone and slows the progression of renal disease.

Hypokalemia has been shown to be a common electrolyte abnormality in cats with chronic renal failure. Indeed, as many as 30% of cats with chronic renal failure may be hypokalemic. Conversely, 13% of cats with chronic renal failure may be hyperkalemic. Therefore, diets fed to cats with chronic renal failure should have adequate, but not excessive, dietary potassium levels. The level in RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) should reduce the risk of hypokalemia, but monitoring potassium status in all cats with chronic renal failure should be emphasized.

Systemic hypertension has been reported in cats with chronic renal failure. In addition, hypertension has been implicated in the progression of renal failure. Sodium homeostasis is primarily regulated by the kidney. With advanced renal failure, the kidneys can no longer excrete adequate amounts of sodium, and the excess dietary sodium may contribute to hypertension. Therefore, dietary sodium intake should be controlled to assist the management of hypertension.

RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) have been clinically proven to significantly reduce the concentrations of blood urea nitrogen, phosphate and parathyroid hormone. Furthermore, RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) have been clinically proven to slow the progression of renal disease in cats. In a study of 50 cats with naturally-occurring renal disease, cats fed RENAL LP 21<sup>TM/MC</sup> (dry) and RENAL LP<sup>TM/MC</sup> (pouch) survived twice as long after diagnosis as cats fed a maintenance diet.

## Special Tips

- Inappetence is a common symptom in cats with renal failure. Therefore, food intake should be monitored to ensure adequate daily caloric intake. Warming the food to body temperature may improve palatability, as will adding water to make a “gravy” with the dry. Try feeding “little and often” and, if necessary, enteral feeding should be considered.
- Cats with renal disease are at risk of becoming dehydrated. Therefore, counsel the owner to be aware of this risk and make sure that fresh drinking water is available at all times.
- Cats with renal disease need to urinate more frequently. The cat’s litter box may need to be cleaned more frequently to ensure that the cat continues to be comfortable using it.

## GENERAL FEEDING RECOMMENDATIONS

- Daily feeding recommendations may be divided into two to four meals.
- Fresh water should be available at all times.
- Individual requirements may vary depending on breed, age, sex, environment, and activity level.

## FEEDING GUIDE

### FEEDING RECOMMENDATIONS FOR FELINE ADULT MAINTENANCE

Body Weight		Suggested Caloric Intake kcal/day	Daily Feeding	
lb	kg		Pouch Only (pouches/day)	Dry Only (8-oz cups/day)
5	2.3	136	1	1/3
7	3.2	191	2	1/2
9	4.1	245	2	2/3
11	5.0	299	3	3/4
13	5.9	354	3	3/4
15	6.8	408	4	1
17	7.7	463	4	1 1/4



## PRODUCT DESCRIPTION

ROYAL CANIN Veterinary Diet™<sup>TMM/C</sup> feline RENAL LP™<sup>TMM/C</sup> is a highly palatable, complete food suitable for adult cats. The phosphorus content of the diet is restricted, and the protein content is low and of high biological value. Only 26% of RENAL LP™<sup>TMM/C</sup> calories are derived from protein, compared with 35% to 55% in a typical canned cat food. In addition, sodium is moderately restricted, and levels of potassium and B-complex vitamins are enhanced.

## NUTRITION STATEMENT

RENAL LP™<sup>TMM/C</sup> is intended for intermittent or supplemental feeding only.



A restricted phosphorus intake is essential to slow the development of renal secondary hyperparathyroidism.



High energy density utilizing dietary fat to reduce feeding volumes in inappetent pets.



Restricted levels of high biological value protein to minimize the production of nitrogenous waste products and improve the clinical signs associated with renal failure.

## GUARANTEED ANALYSIS

Crude Protein, (min)	7.0%
Crude Fat, (min)	8.5%
Crude Fiber, (max)	1.0%
Moisture, (max)	78.0%
Phosphorus, (min)	0.09%

## METABOLIZABLE ENERGY

From Protein	26.3%
From Fat	63.5%
From Carbohydrate	10.2%

Approximately 125 kcal per 3 oz (85 g) pouch (148 kcal per 100 g).

## INGREDIENTS

WATER, CHICKEN BY-PRODUCTS, MEAT BY-PRODUCTS, CORN FLOUR, VEGETABLE OIL, CHICKEN, CORN STARCH, NATURAL FLAVORS, TRACE MINERALS (CALCIUM CARBONATE, POTASSIUM CHLORIDE, ZINC SULFATE, MANGANESE SULFATE, COPPER SULFATE), GUAR GUM, TAURINE, VITAMINS (CHOLINE CHLORIDE, DL-ALPHA TOCOPHEROL ACETATE [SOURCE OF VITAMIN E], NIACIN, RIBOFLAVIN [VITAMIN B2], THIAMINE MONONITRATE [VITAMIN B1], D-CALCIUM PANTOTHENATE, VITAMIN D3 SUPPLEMENT, BIOTIN, PYRIDOXINE HYDROCHLORIDE [VITAMIN B6], FOLIC ACID, VITAMIN B12 SUPPLEMENT).



## FELINE

### TYPICAL ANALYSIS

Nutrient	Unit	Per 100 g as fed	Per 1000 kcal
Moisture	g	74.58	
Protein	g	8.68	69.44
Fat	g	10.62	84.96
Carbohydrate	g	4.39	35.12
Ash	g	1.47	11.76
Crude Fiber	g	0.26	2.08
<b>Minerals</b>			
Calcium	g	0.30	2.40
Phosphorus	g	0.14	1.12
Sodium	g	0.12	0.96
Chloride	g	0.12	0.96
Potassium	g	0.28	2.24
Magnesium	g	0.019	0.15
Copper	mg	0.43	3.46
Iron	mg	5.16	41.28
Zinc	mg	4.19	33.52
Manganese	mg	0.619	4.95
Iodine	mg	0.015	0.12
<b>Vitamins</b>			
Vitamin A	IU	1810	14480
Vitamin D3	IU	54.6	436.8
Vitamin E	mg	10.10	80.80
Thiamine (B1)	mg	0.92	7.36
Riboflavin (B2)	mg	4.87	38.96
Niacin	mg	9.15	73.20
Pyridoxine (B6)	mg	0.52	4.16
Pantothenic Acid	mg	2.61	20.88
Folic Acid	mg	0.319	2.552
Cobalamin (B12)	mg	0.0058	0.0464
Biotin	mg	0.039	0.312
Choline	mg	184.3	1474
<b>Fatty Acids</b>			
Linoleic acid	g	1.56	12.48
Arachidonic acid	g	0.06	0.48
<b>Amino Acids</b>			
Arginine	g	0.40	3.20
Lysine	g	0.52	4.16
Methionine	g	0.15	1.20
Methionine + Cystine	g	0.25	2.00
Taurine	g	0.1895	1.516



### ORDERING INFORMATION

Pouches	Weight		Item Code
	oz	g	
24 per case	3	85	K60421

## PRODUCT DESCRIPTION

ROYAL CANIN Veterinary Diet™<sup>TM/MC</sup> feline RENAL LP 21™<sup>TM/MC</sup> is a highly palatable, complete food suitable for adult cats. The phosphorus content of the diet is restricted and the protein content is low and of high biological value. Only 21% of calories in RENAL LP 21™<sup>TM/MC</sup> are derived from protein, compared with 35% to 55% in a typical cat food. In addition, sodium is moderately restricted and levels of potassium and B-complex vitamins are enhanced.

## NUTRITION STATEMENT

RENAL LP 21™<sup>TM/MC</sup> is intended for intermittent or supplemental feeding only.



A restricted phosphorus intake is essential to slow the development of renal secondary hyperparathyroidism.



Moderately restricted sodium concentrations to reduce renal hypertension and supplemented with potassium and B-vitamins to compensate for urinary losses.



Restricted levels of high biological value protein to minimize the production of nitrogenous waste products and improve the clinical signs associated with renal failure.



Naturally preserved with mixed tocopherols, rosemary extract, and citric acid.

## GUARANTEED ANALYSIS

Crude Protein, (min)	21.0%
Crude Fat, (min)	19.0%
Crude Fiber, (max)	5.4%
Moisture, (max)	8.5%
Phosphorus, (min)	0.3%

## METABOLIZABLE ENERGY

From Protein	20.7%
From Fat	42.6%
From Carbohydrate	36.6%

Approximately 409 kcal per 8-oz cup; 443 kcal per 100 g; 92 g per 8-oz cup.

## INGREDIENTS

RICE, GROUND CORN, CHICKEN FAT, CORN GLUTEN MEAL, CHICKEN MEAL, NATURAL FLAVORS, CELLULOSE POWDER, DRIED EGG POWDER, POTASSIUM CHLORIDE, CALCIUM CARBONATE, BREWERS YEAST, CHOLINE CHLORIDE, POTASSIUM CITRATE, TAURINE, VITAMINS [DL-ALPHA TOCOPHEROL (SOURCE OF VITAMIN E), NIACIN, BIOTIN, RIBOFLAVIN (VITAMIN B2), D-CALCIUM PANTOTHENATE, PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), THIAMINE MONONITRATE (VITAMIN B1), VITAMIN B12 SUPPLEMENT, VITAMIN A ACETATE, VITAMIN D3 SUPPLEMENT, FOLIC ACID], TRACE MINERALS [ZINC OXIDE, FERROUS SULFATE, COPPER SULFATE, MANGANOUS OXIDE, SODIUM SELENITE, CALCIUM IODATE], PRESERVED WITH NATURAL MIXED TOCOPHEROLS, ROSEMARY EXTRACT, AND CITRIC ACID.



## FELINE

### TYPICAL ANALYSIS

Nutrient	Unit	Per 100 g as fed	Per 1000 kcal
Moisture	g	7	
Protein	g	23.0	51.9
Fat	g	21.0	47.4
Carbohydrate	g	40.6	91.6
Ash	g	5.0	11.3
Crude Fiber	g	3.4	7.7
Total Dietary Fiber	g	6.6	14.9
<b>Minerals</b>			
Calcium	g	0.82	1.85
Phosphorus	g	0.46	1.04
Sodium	g	0.15	0.34
Chloride	g	0.70	1.58
Potassium	g	0.95	2.14
Magnesium	g	0.04	0.09
Copper	mg	3.2	7.2
Iron	mg	13.5	30.4
Zinc	mg	23.0	51.9
Manganese	mg	6.9	15.6
Iodine	mg	0.44	0.99
Selenium	mg	0.031	0.070
<b>Vitamins</b>			
Vitamin A	IU	2100	4736
Vitamin D3	IU	115	259
Vitamin E	mg	30	67.66
Thiamine (B1)	mg	1.4	3.2
Riboflavin (B2)	mg	4.9	11.1
Niacin	mg	15.4	34.7
Pyridoxine (B6)	mg	4.1	9.2
Pantothenic Acid	mg	5.5	12.4
Folic Acid	mg	1.2	2.7
Cobalamin (B12)	mg	0.014	0.032
Biotin	mg	0.31	0.70
Choline	mg	300	677
<b>Fatty Acids</b>			
Linoleic acid	g	4.9	11.1
Arachidonic acid	g	0.07	0.16
<b>Amino Acids</b>			
Arginine	g	1.1	2.5
Lysine	g	0.8	1.8
Methionine	g	0.55	1.2
Methionine + Cystine	g	0.93	2.1
Taurine	g	0.2	0.5



### ORDERING INFORMATION

Bag Size	Weight		Item Code
	lb	kg	
Small	3	1.36	26203
Medium	7	3.18	26207
Large	n/a	n/a	n/a

## REFERENCES

- Elliott J, Syme HM, Markwell PJ. Acid-base balance of cats with chronic renal failure: Effect of deteriorating renal function. *J Small Anim Pract.* 1993;44:261-8.
- Elliott J, Syme HM, Reubens E, et al. Assessment of acid-base status of cats with naturally occurring chronic renal failure. *J Small Anim Pract.* 2003;74:145-51.
- Syme HM, Barber PJ, Markwell PJ, et al. Prevalence of systolic hypertension in cats with chronic renal failure at initial evaluation. *J Am Vet Med Assoc.* 2002;220(12):1799-804.
- Elliott J, Barber PJ, Syme HM, et al. Feline hypertension: clinical findings and response to antihypertensive treatment in 30 cases. *J Small Anim Pract.* 2001;42(3):122-9.
- Syme HM, Markwell PJ, Elliott J. Aldosterone and plasma renin activity in cats with hypertension and / or chronic renal failure. *J Vet Intern Med* 2002;16:354.
- Elliott J, Rawlings JM, Markwell PJ, et al. Survival of Cats with naturally occurring Chronic Renal Failure: Effect of Dietary Management *J Small Anim Pract.* 2000;41:235-242.
- Barber PJ, Elliott J, Markwell PJ, et al. Effect of dietary phosphate restriction on renal secondary hyperparathyroidism in the cat. *J Small Anim Pract*1999;40:62-70.
- Barber PJ, Elliott J, Markwell PJ, et al. Effect of conventional dietary management of renal secondary hyperparathyroidism in the cat. *J Small Anim Pract*1999;40:62-70.
- Markwell PJ, Barber PJ, Rawlings JM, et al. Recent advances in the dietary management of chronic renal failure in cats. *Recent Advances in Animal Nutrition in Australia* 1999;12:115-119.
- Elliott J, Barber PJ, Rawlings JM, et al. Effect of phosphate and protein restriction on progression of chronic renal failure in cats. *J Vet Intern Med* 1998;12:221.
- Markwell PJ, Bauer JE, Rawlings JM, et al. The impact of dietary fat and polyunsaturated fatty acids on renal disease: a short review of data from clinical and experimental studies. *Journal of Animal Physiology and Animal Nutrition* 1998;80:234-238.
- Barber PJ, Rawlings JM, Markwell PJ, et al. Effect of medical management of feline hyperthyroidism on parameters of renal function and calcium metabolism. *Proceedings of the BSAVA Congress* 1996: p194.
- Barber PJ, Rawlings JM, Markwell PJ, et al. Treatment of hyperparathyroidism in feline chronic renal failure. *J Vet Intern Med* 1996;10:166.
- Crocker R, Bauer J, Malcik K, et al. Effects of urinary polyunsaturated fatty acids on urinary eicosanoids in chronic renal failure. *J Vet Intern Med* 1996;10:166.
- Barber PJ, Rawlings JM, Markwell PJ, et al. Effect of conventional medical management for feline chronic renal failure on renal function and secondary hyperparathyroidism. *Proceedings of the BSAVA Congress* 1995;186.
- Barber PJ, Rawlings JM, Markwell PJ, et al. The role of calcitriol in feline renal secondary hyperparathyroidism. *Proceedings of the 5th Annual Congress of the European Society of Veterinary Internal Medicine* 1995;58-59.
- Harte JG, Markwell PJ, Moraillon R, et al. Dietary management of naturally occurring chronic renal failure in cats. *J Nutr* 1994;124: 2660S-62S.
- Smith BHE, Frith N, Markwell PJ. Effects of dietary management of renal disease on certain biochemical parameters. *Animal Chemical Society Newsletter* 1994.
- Zoran D, Harte J, Senior D, et al. Effects of polyunsaturated fatty acids on indices of renal function. *J Vet Intern Med* 1994;8(2):167.
- Markwell PJ, Harte JG, Moraillon R, et al. Dietary management of naturally occurring renal disease in cats. *Proceedings of the Waltham Symposium on the Nutrition of Companion Animals* 1993:65.

