POTTENGER'S CATS

A Study in Nutrition

By Francis M. Pottenger, Jr., M.D.

Edited by

Elaine Pottenger
with
Robert T. Pottenger, Jr., M.D.

Price, a practicing dentist with a congenial spirit of inquiry. In his desire to explain the prevalence of tooth decay and facial inadequacies among his patients and "civilized peoples," Price set upon a worldwide odyssey to study the dietary habits of fourteen isolated and primitive peoples. He found that those natives who still ate their customary natural foods—whether primarily fish, meat or vegetable—showed broad facial structures, a "perfection" to their dental arches and virtually no tooth decay, while those who had been exposed to the civilized diet of commerce based on refined white sugar, white flour, canned and packaged foods, showed narrowing of their faces, crowding of their teeth and a high incidence of cavities. They also showed increasing susceptibility to tuberculosis and other degenerative disease.

Appreciating the importance of Weston Price's findings and their confirmation of his own experimental and clinical findings, Francis became chairman of a committee established for the purpose of disseminating Price's work through exhibits, lectures and printed materials. Later, the Weston A. Price Foundation was organized as a non profit organization to further this educational purpose. At his death, Francis's extensive library of research data, slides, X-ray studies, papers and articles were entrusted to the foundation by his family. In response, the Board of Directors changed the foundation's name to the Price Pottenger Foundation and later to the Price Pottenger Nutrition Foundation. The foundation now actively disseminates the work of both men.

During his professional career, Francis wrote many articles which appeared in different medical publications. Appendix II lists these papers and articles. One of his favorite, unpublished stories took place at a nutrition meeting he was attending. A reporter came up to him and asked, "Are all these people here interested in nutrition?"

Francis answered, "Yes."

The reporter commented, "They certainly are not a very healthy looking crowd."

To which Francis replied quizzically, "Why do you think we are here?"

Francis and Elizabeth had four children: Francis Marion, III, Margaret Elizabeth, Barbara Jane and Samuel Slatter. Francis III received his doctorate in education and is presently supervising the curriculum for the public school system in Hawaii. Margaret is the owner of two dress stores called the Jabberwocky in Tustin, California. Barbara lives with her lawyer husband, Jim Shumar, in Whitacre, Virginia. Samuel is deceased.

Francis's younger brother, Robert Thomas, practiced medicine in Pasadena, California. In addition to promoting the importance of optimal nutrition, Robert pioneered clinical research in the area of food allergy in the treatment and control of arthritis and rheumatism. The authors of this monograph are the son and daughter of Robert. Robert Thomas Pottenger, Jr., is a practicing physician in Pasadena and continues the tradition of his father and uncle in his own research and clinical practice. Elaine Pottenger is a writer.

VARIATION — RAW MILK FROM COWS FED DRY FEED AND FROM COWS FED FRESH FEED

In the course of producing and marketing adrenal cortical extracts, we began noting that the adrenal glands being used differed greatly in their potency.* Seeking an explanation for this, we discovered that the glands of the highest potency came from cows and steers killed in Denver, and those of the lowest potency came from cows and steers slaughtered in the Los Angeles area. Tracing this back, we learned that Denver animals were pastured on young, rapid growing range grasses while the Los Angeles animals were fed mostly dry feed consisting of molasses, cotton seed meal, beet pulp, orange pulp, grape pulp and other industrial by-products, field-dried alfalfa and grain. We further learned that the reproductive efficiency of range cows is greater than dry feed lot cows, and that a high rate of mortality exists among dry feed lot calves.

From this information, it appears logical to assume that dietary factors not only influence the potency of adrenal glands, but also influence the nutritive quality of cow's milk. Just as the adrenal hormones of cows fed on green pasture continually show a high concentration and potency, so their milk appears to have a high concentration of the growth activators necessary for their calves' healthy development; and just as the hormones of dry feed lot cows are of low concentration, so their milk appears deficient in the growth activators necessary for nurturing and supporting their young.

In comparing the experimental effects on cats of a diet including raw milk from fresh feed cows and those of a diet including raw milk from dry feed cows, we find that the cats fed raw milk from dry feed cows show similar deficiencies as those fed pasteurized milk. Moreover, cats fed cooked meat, milk produced from dry feed cattle and cod liver oil always deliver deficient kittens and have trouble nursing, while cats fed a high grade raw milk from cows grazing on green pasture or from cows fed freshly cut greens, cooked meat and cod liver oil do better. The high grade raw milk appears to lessen the deficiencies produced by the cooked meat. Conversely, cats fed dry feed raw milk, raw meat and cod liver oil deliver normal kittens and have adequate milk supplies. Here, the raw meat counters the deficiency in the dry feed raw milk.

*As the text reflects Francis M. Pottenger's original writing, the "we" refers to him and his staff.

Chicken Industry

The same dry feed versus fresh feed findings hold true of the chicken industry.

Farm chickens get out and scratch for worms and eat green grasses and weeds. They lay eggs with hard shells and deep yellow yokes; and when these eggs are fertilized, they hatch husky, healthy chicks. In addition, farm chickens have supple skin, firm musculature and almost twice as much calcium for a given weight of bone as mass produced, hatchery chickens.

In contrast, hatchery chickens are housed in wire pens and fed various grains and other dry feeds. They lay eggs with thin shells and pale yokes; and when their eggs are fertilized, a large percentage fail to germinate. The hatchery chicken has thick skin, lax musculature, pale fat, soft flesh and much smaller bones than the farm chicken.

In comparing the diets of farm and hatchery chickens and of range and dry feed lot cattle, we find that they all contain adequate amounts of fat, protein, carbohydrate and minerals. *The difference lies in the presence or absence of fresh factors.* It is the fresh, raw factors in feed that appear to hold the balance between a healthy animal capable of reproducing healthy offspring and one that is unhealthy and has poor reproductive efficiency. Logically, the nutritional value of animal products such as milk and eggs depends on the nutritional value of the producing animals' diet. (See work of Oscar Erf, Chap. 10.)

VARIATION — GUINEA PIGS FED DRY FEED AND FRESH FEED

Dried Herbs?

In this experiment, a group of guinea pigs is initially fed a diet of rolled and cracked grain with supplements of cod liver oil and field-dried alfalfa. Shortly, they show loss of hair, paralysis and high litter mortality. Diarrhea, pneumonia and other deficiency symptoms increase. When fresh cut green feed (grass cut after sundown, sacked and delivered before sunrise) is introduced into their diet, the guinea pigs show remarkable improvement. Infant mortality decreases and the animals become huskier. No new cases of paralysis develop and the alopecia lessens, though it does not disappear entirely. A few guinea pigs with severe diarrhea and loss of hair are allowed to run

outside the pens to feed on growing grass and weeds. In less than 30 days, these foraging animals show even greater improvement than those receiving cut greens inside the pens. Their diarrhea stops, their hair returns with a soft, shiny, velvety texture; they heal and become well. When they are placed back inside the pens, they show no further signs of gastrointestinal upset or other ailments.

Looking for an explanation of this more dramatic improvement in the guinea pigs feeding on the fresh growing grasses and weeds, we noticed that when we put our arms inside the sacks of cut grass, the temperature inside was warmer than the temperature outside. It proved to range between 5 degrees and 30 degrees warmer. This suggests that the sacked, cut grass becomes semi-cooked by the time it reaches the guinea pigs, and that important thermolabile substances are at least partly destroyed.

Chapter Four

THE EFFECT OF RAW AND COOKED FOOD ON THE DENTOFACIAL DEVELOPMENT OF CATS

"The Effect of Heat Processed Foods and Metabolized Vitamin D Milk on the Dentofacial Structures of Experimental Animals," "The Influence of Heat Labile Factors on Nutrition in Oral Development and Health," "Nutritional Aspects of the Orthodontic Problem"

Normal Cats

The cats receiving a raw meat, raw milk diet maintain a regular broad face with prominent malar and orbital arches, adequate nasal cavities, broad dental arches and regular dentition from generation to generation. The configuration of the female skull remains distinct from that of the male, and each maintains its normal facial outlines. The mucous membranes are firm and of good, pink color showing no evidence of infection or degenerative change. The teeth erupt without difficulty and remain basically free of decay. See Figures 4.1 and 4.2.

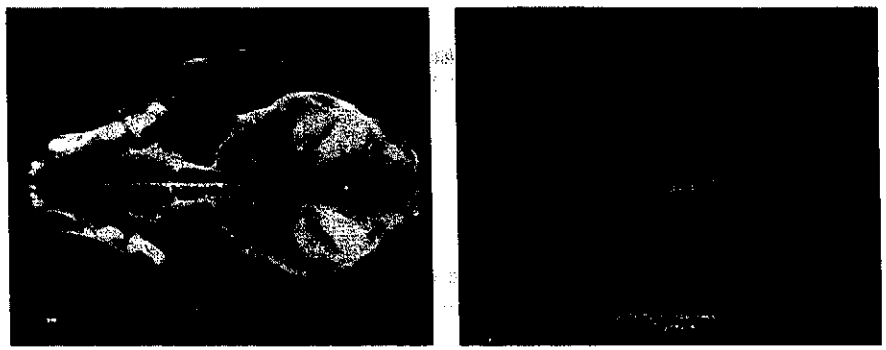

Fig. 4.1—Raw meat fed cat's skull.

Fig. 4.2—Lateral x-ray of half jaw of cat 539, showing a normal jaw structure, good distribution of trabeculae, well-developed condyle, and well-developed pterygoid process of the mandible. Alveolar crest of normal height; even distribution of teeth.

autopsy and examined for any abnormalities or birth defects either by the naked eye or through a microscope. Such postmortem examinations accompanied the death of all cats.

X-ray studies were made of some of the cats in order to study the effects of the various experimental diets on their skeletal development. Moreover, calcium and phosphorus determinations were made during the postmortem of most of the experimental animals. These determinations were confined basically to the size and weight of the femurs and the percentage of calcium and phosphorus in them.

At the end of ten years, 600 out of 900 cats studied had complete, recorded health histories. The majority of these records are in the archives of The Price Pottenger Nutrition Foundation.

DEFINITIONS

As The Cat Study includes several generations of cats, it is necessary to understand how the different generations are classified before discussing the actual feeding experiments. In classifying the experimental animals, the word *diet* describes the actual food intake of the individual cat. An *optimum diet* refers to a diet of raw food including raw meat, raw milk and cod liver oil. A *deficient diet* refers to a diet including one or more cooked foods plus cod liver oil. Cod liver oil is routinely included in all experimental diets as a rich supplemental source of vitamin A.

According to the diet variables of raw or cooked foods, the cats are grouped in three general health classifications: (1) Normal, (2) Deficient, and (3) Regenerating.

Normal Cats

Normal cats are born of healthy parents and are maintained on an optimum diet of raw food and cod liver oil. They are the control cats used for comparison with the deficient and regenerating cats. The breeding males used in the various experiments are always of this normal group, and are of proven fertility so that experimental results primarily reflect the condition of the health of the mother cats.

Deficient Cats

First Generation Deficient Cats: These cats are either mature cats

donated to the study or mature cats born of experimental animals and raised on an optimum diet. When these adult cats are placed on deficient diets including cooked food, they are called deficient cats of the first generation.

Second Generation Deficient Cats: These cats are the kittens born to females of the first deficient generation eating a deficient diet for various lengths of time prior to and during gestation and lactation. At the end of nursing, these kittens are maintained on a deficient diet.

Third Generation Deficient Cats: These cats are the kittens born of the second deficient generation and maintained on deficient diets all their lives.

Regenerating Cats

Regenerating Kittens of the First Order: When a female cat of the first deficient generation is placed back on an optimum raw diet after giving birth to a deficient litter, her next kittens, benefiting from her improved diet, are called Regenerating Kittens of the First Order.

Regenerating Kittens of the Second Order: These kittens are born to a cat of the second deficient generation and placed on an optimum diet.

There are never more than three generations of deficient cats because of the third generation's inability to produce healthy, viable offspring. Consequently, there are no third or fourth orders of regenerating cats.

Chapter Two

THE RAW MEAT VERSUS COOKED MEAT FEEDING EXPERIMENT

"The Effect of Heat Processed Foods and Vitamin D Metabolized Milk on the Dentofacial Structures of Experimental Animals," "Heat Labile Factors Necessary for the Proper Growth and Development of Cats," "Clinical and Experimental Evidence of Growth Factors in Raw Milk," "The Influence of Heat Labile Factors on Nutrition in Oral Development and Health"

In this feeding experiment one group of cats receives a diet of ⅔ raw meat, ⅓ raw milk and cod liver oil. The second group receives ⅔ cooked meat, ⅓ raw milk and cod liver oil. Comparisons are made between the two groups on the basis of their growth, skeletal development, dentofacial structures and dental health, the calcium and phosphorus content of their femurs at death, their resistence to infections, their allergic sensitivity and their reproductive efficiency (reproductive efficiency as used by Dr. Pottenger means the ability of the female cat to become pregnant, deliver and nurse viable offspring).

GENERAL OBSERVATIONS

Raw Meat Group

The cats fed a diet of ⅔ raw meat, ⅓ raw milk and cod liver oil show striking uniformity in their sizes and their skeletal developments. From generation to generation they maintain a regular, broad face with prominent malar and orbital arches, adequate nasal cavities, broad dental arches and regular dentition. The configuration of the female skull is different from the male skull and each sex maintains its distinct anatomical features. The membranes are firm and of good, pink color with no evidence of infection or degenerative change. Tissue tone is excellent and the fur of good

quality with very little shedding noted. In the older cats, particularly the males engaging in fighting, the incisors are often missing, but inflammation and disease of the gums is seldom seen.

The calcium and phosphorus content of their femurs remains consistent and their internal organs show full development and normal function. Over their life spans, they prove resistent to infections, to fleas and to various other parasites, and show no signs of allergies. In general, they are gregarious, friendly and predictable in their behavior patterns, and when thrown or dropped as much as 6 feet to test their coordination, they always land on their feet and come back for more "play." These cats reproduce one homogeneous generation after another with the average weight of the kittens at birth being 119 grams. Miscarriages are rare and the litters average five kittens with the mother cat nursing her young without difficulty.

Cooked Meat Group

The cats fed a diet of ⅔ cooked meat, ⅓ raw milk and cod liver oil reproduce a heterogeneous strain of kittens, each kitten in a litter being different in size and skeletal pattern. When comparing the changes in configuration found in their X-rays, there are almost as many variations in the facial and dental structures of the second and third generation cooked meat fed animals as there are animals. Evidence of deficiencies is written so plainly on their faces that with a little training, any observer can be almost certain that a given cat has been subjected to a deficient diet or that it comes from a line of cats that has suffered from deficient nutrition.

The long bones of cooked meat cats tend to increase in length and decrease in diameter with the hind legs commonly increasing in length over the forelegs. The trabeculation (the internal structural mesh of the bones) becomes coarser and shows evidence of less calcium. In the third generation, some of the bones become as soft as rubber and a true condition of osteogenesis imperfecta is present.

Heart problems; nearsightedness and farsightedness; underactivity of the thyroid or inflammation of the thyroid gland; infections of the kidney, of the liver, of the testes, of the ovaries and of the bladder; arthritis and inflammation of the joints; inflammation of the nervous system with paralysis and meningitis—all occur commonly in these cooked meat fed cats. A decrease in visceral volume is evidenced by the diminishing size of their thoracic and abdominal cavities.

Frank infections of the bone appear regularly and often appear to be the cause of death. By the time the third deficient generation is born, the cats are so physiologically bankrupt that none survive beyond the sixth month of life, thereby terminating the strain.

A study of the microscopic sections of the lungs of second and third generation deficient cats show abnormal respiratory tissues. The lungs show hyperemia, some edema and partial atelectasis, while the most deficient show bronchitis and pneumonitis. In several cases, a hypothyroid condition exists with the thyroid gland showing scanty colloid and small acini, again not observable in raw meat fed cats.

Cooked meat fed cats show much more irritability. Some females are even dangerous to handle and three are named Tiger, Cobra and Rattlesnake because of their proclivity for biting and scratching. The males, on the other hand, are more docile, often to the point of being unaggressive and their sex interest is slack or perverted. In essence, there is evidence of a role reversal with the female cats becoming the aggressors and the male cats becoming passive as well as evidence of increasing abnormal activities between the same sexes. Such sexual deviations are not observed among the raw food cats.

Vermin and intestinal parasites abound. Skin lesions and allergies appear frequently and are progressively worse from one generation to the next. Pneumonia and empyema are among the principal causes of death in adult cats while diarrhea followed by pneumonia takes a heavy toll on the kittens.

At autopsy, cooked meat fed females frequently present ovarian atrophy and uterine congestion, and the males often show failure in the development of active spermatogenesis. Abortion in pregnant females is common, running about 25 percent in the first deficient generation to about 70 percent in the second generation. Deliveries are generally difficult with many females dying in labor. The mortality rate of the kittens also is high as the kittens are either born dead or are born too frail to nurse. Following delivery, a few mother cats steadily decline in health only to die from some obscure physiological exhaustion in about three months. Other cats show increasing difficulty with their pregnancies and in many instances fail to become pregnant. The average weight of the kittens born of cooked meat fed mothers is 100 grams, 19 grams less than the raw meat nurtured kittens.

Figure 2.1 shows a cat that has been on a cooked meat diet for over a year. She delivers 6 kittens, 2 of which she eats on the first day. She shows no inclination to care for the remaining. Upon examination, it is found that she is unable to nurse her kittens because her mammary glands present no evidence of preparation for lactation. The four kittens are placed on dropper feedings of cow's milk on the second day. Three die of diarrhea on the third day. The fourth is placed with the lactating cat shown in Figure 2.2, but it dies on the fourth day in spite of every attempt on the part of the foster mother to care for it.

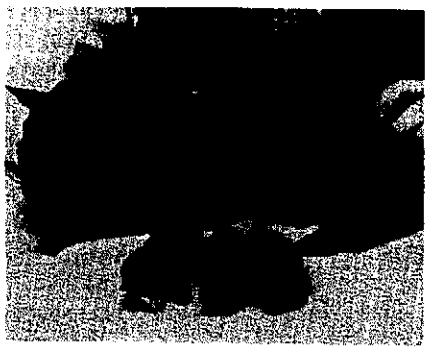

Fig. 2.1—Adult female cat 524. On cooked meat and raw milk for six months and during pregnancy. 1936 litter. Note dull eyes, poor fur. Three kittens, 4 days old, dead.

Fig. 2.2—Adult female cat, one year old, on raw meat and milk. First litter in pens, 1936. Four kittens, 4 days old. Note full development and activity of kittens. Note smoothness and luster of fur. Inactive kitten second from left is kitten of cat 524.

Figure 2.2 shows a raw food fed mother and her four kittens born the day before the ill-fated kittens above. The mother cat is 11 months old and has been fed raw meat, raw milk and cod liver oil since the age of two months. She delivers 6 kittens, losing 2 on account of her failure to rupture the amniotic sac in time. She has large mammae and has no difficulties in nursing her young. Her kittens have broad faces and show excellent skeletal development.

Regenerating Cats

When cats of the first and second generation cooked meat fed groups are returned to a raw meat diet, they are classified as regenerating animals of the first and second orders. Their progeny are then maintained on an optimum diet to measure the time needed to rebuild their health to that of the normal cats. It requires approximately four generations for either order to regenerate to a state of

normal health. However, because of the lack of reproductive efficiency, very few deficient animals regain the normal health noted before deficiency was imposed on their line of cats.

Improvement in resistance to disease is noted in the second generation regenerating cat, but allergic manifestations persist into the third generation. In the third generation, skeletal and soft tissue changes are still noticeable, but to a lesser degree; and by the fourth, most of the severe deficiency signs and symptoms disappear—but seldom completely.

One of the experiment's more startling discoveries is that once a female cat is subjected to a deficient diet for a period of 12 to 18 months, her reproductive efficiency is so reduced that she is never again able to give birth to normal kittens. Even after three or four years of eating an optimum diet, her kittens still show signs of deficiency in skeletal and dental development. When her kittens are maintained on an optimum diet, a gradual reversal and regeneration takes place.

VARIATION—RAW MEAT AND COOKED MEAT ALTERNATED

In this experiment, one group of cats is fed raw meat, placed on a diet of cooked meat for six months and then returned to a raw meat diet. (The six month exposure to cooked food is timed to correspond to the human teenage years.) When a female cat on this alternated diet becomes pregnant, her kittens exhibit some deficiency symptoms although she may appear in good health. Her succeeding litters show irregularities that tend to lessen in intensity for the first two or three years of her reproductive life and then increase again. As long as her kittens receive the optimum raw diet, their health improves; however, when they are given cooked meat for a period of time, their resistance to disease greatly diminishes only to improve when they are returned to the raw meat diet. These raw meat, cooked meat fed cats partially maintain their skeletal structures from generation to generation, but their calcification continues to diminish; and their reproductive efficiency is injured from the standpoints of the size and the vitality of their kittens and of the failure of their litters to conform to a homogeneous pattern.

outside the pens to feed on growing grass and weeds. In less than 30 days, these foraging animals show even greater improvement than those receiving cut greens inside the pens. Their diarrhea stops, their hair returns with a soft, shiny, velvety texture; they heal and become well. When they are placed back inside the pens, they show no further signs of gastrointestinal upset or other ailments.

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Chapter Four

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Fig. 4.1—Raw meat fed cat's skull.

Fig. 4.2—Lateral x-ray of half jaw of cat 539, showing a normal jaw structure, good distribution of trabeculae, well-developed condyle, and well-developed pterygoid process of the mandible. Alveolar crest of normal height; even distribution of teeth.

Deficient Cats

First Generation: Adult cats placed on a cooked meat or pasteurized milk diet begin to show unhealthy conditions in their mouths within three to six months. A pregnant cat shows the changes more rapidly. These cats first present gingivitis followed by incrustation of salivary calculi which continues to increase whether the cat is maintained on a deficient diet or returned to an optimum diet. As salivary deposits increase, their gums become spongy. This leads to infections and abscesses which sometimes break through the lining of the cheek and drain outside. In three to five years, all the incisors and most of the molars are missing. The "fangs" or canine teeth prove the most resistent to abscesses and loss. Interestingly, no caries are noted in this first deficient generation of cats. See Figure 4.3.

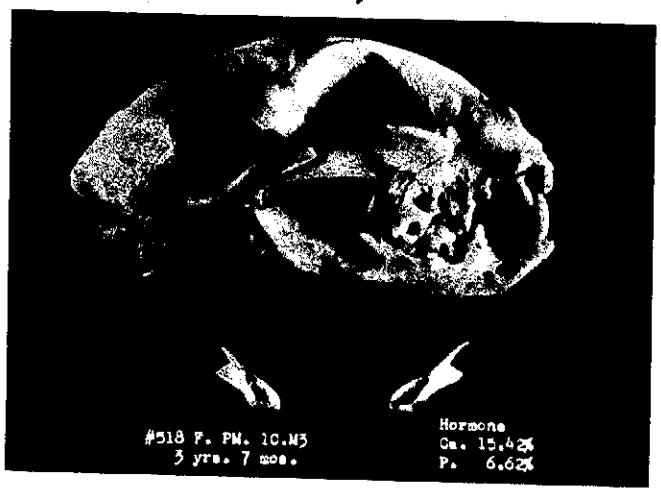

Fig. 4.3—First generation female cat 518, nursed one month, on a cooked-meat diet for three years, three months. She was then placed on the pasteurized milk experiment and died three months later. Note flattening of the entire skull with poor development of the condylar fossae. Distance from the zygomatic arch to the lower border of the mandible is lesser in the posterior jaw than the anterior in the region of the premolar teeth. Well-developed paradentosis with vertical atrophy. Poor distribution of trabeculae. Erosion of the condyle. Root resorption present in both upper and lower teeth.

Second Generation: In the second generation of cooked food fed cats, the newborn deficient kittens show irregular development of the contours of the skull cap and a narrowing of the malar and orbital arches. The latter become incomplete as deficiency progresses. Most of the cats show longer and narrower faces with a retraction in the middle third due to diminished development of the zygomatic arch and diminished closure of the frontal sinuses. Failure in the lateral

movement of the face causes material narrowing of the mandible and maxillary portions so that there is insufficient room for a complete set of teeth to descend into place; and recessive or protruding mandibles are common causing underbites and overbites. See Figures 4.6, 4.7 and 4.8.

Fig. 4.6—Second generation male cat 513, second litter, cooked meat. Note apparently good skull except for incomplete orbital arch, resorption of the condyle, and the pulling up of the posterior portion of the mandible in comparison with the anterior portion.

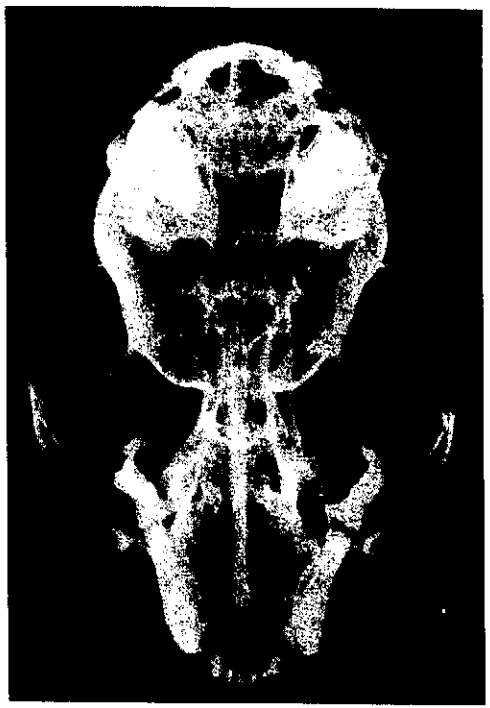

Fig. 4.7—X-ray of basal view of skull of second generation male cat 513, as in Fig. 4.6. Note lack of development of orbital arch and osteoporosis.

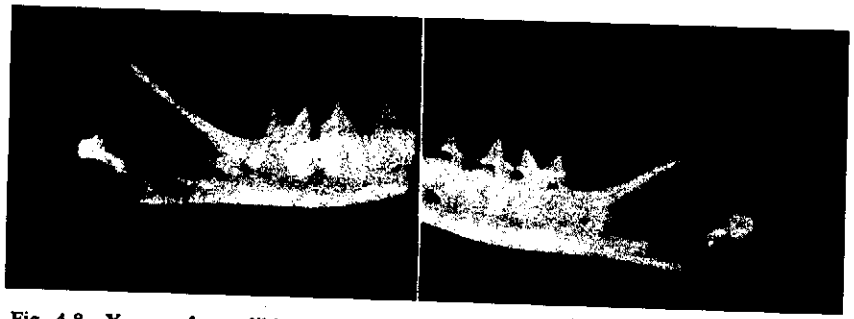

Fig. 4.8—X-rays of mandible of male cat 513, as in Fig. 4.6. Note extreme osteoporosis, with almost complete loss of trabeculae, and failure in development of the heads of the condyles.

There is frequent delay in the loss of the deciduous teeth, and therefore, permanent teeth do not erupt at a regular time as they do in the raw food fed cats. Their eruption is often accompanied by bleeding gums, by runny noses, by fevers and by prostration as opposed to normal cats that have teeth without problems. The primary teeth are usually smaller and more irregular in size and in shape than those of normal kittens. This is particularly true of the central incisors, but also true of the canines, premolars and molars.

Where the canine teeth are quite resistent to deficiency in the first generation, active root absorption occurs in the second generation with softening of the base of the apices and loosening of the teeth. Frequently the canines fall out before the molars. Absence of teeth, especially the incisors, is quite common. As the jaw does not expand or widen to make room for the permanent teeth, these teeth show considerable crowding, twisting and impaction. See Figure 4.9.

Fig. 4.9—Female kitten, age 12 months, litter mate of kitten in Fig. 4.10, fed table scraps until 10 months of age. Note imperfect alignment of teeth.

The permanent teeth show greater irregularity in their size and alignment than the deciduous teeth. Marked retraction of the mandible with failure in calcification causes poor bony support for the teeth. As in the first generation of deficiency, gums are spongy and abscesses develop. An interesting finding is that root resorption occurs more commonly among cats fed a diet of heat-processed milk than among those fed cooked meat.

Third Generation: The degenerative changes in the skull and mouth grow more pronounced in the third generation of cooked food fed cats. The frontal sinuses and zygomatic arch show little development which allows for further retraction of the middle third of the face. The skull of the second generation deficient adult is smaller than that of the first deficient generation of the same age. The skull of the third generation is materially smaller than that of the second generation. However, there are some variations. Some kittens have larger than normal brain cases with smaller than normal faces, and these animals have a relatively poor forward projection of the face as a whole. At times there is a marked tendency for the configuration of the skull in both males and females to approach the shape of the normal animal of the opposite sex.

In these third generation deficient cats, the bones are very fine with scarcely enough structure to hold the skull together. The teeth are smaller and much more irregular in size, shape and alignment, and when the permanent teeth erupt, the cats are frequently prostrate. In some of these deficient kittens, the failure of the anterior movement of the jaw is so great that the posterior molars, instead of being embedded in the corpus of the mandible, remain in the ramus; and the crown of the teeth, instead of being parallel to the floor of the mouth, is perpendicular to it—a description of impacted wisdom teeth.

Kittens in which deficiency is established by an inadequate diet show stigmata throughout their lives. If deficient kittens are allowed to live in the open and to feed upon rats, mice, birds, gophers and other food natural to the cat, they will show a certain degree of correction in their deficiencies.

Two litter mates offer a good comparative example of the improvement possible by a natural diet. The mother of these two kittens is a deficient animal eating cooked food. One of the litter mates is kept in a pen on a similar deficient diet until approximately ten

months of age; the other, at five weeks of age, is forced to forage in the wilds. The penned kitten shows marked dental deformity; the foraging kitten shows the effects of its deficient history, but reveals major correction in the alignment of its teeth and in its general physiological stability. See Figure 4.10.

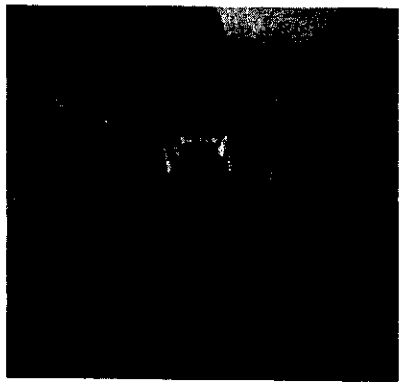

Fig. 4.10—Female kitten age 12 months, forced to forage for self from the age of 4 to 6 weeks. Note regular alignment of teeth.

The improvement in the foraging kitten is probably caused by its better diet, but also by the exercise it received eating its hunted prey with all the ripping, tearing and chewing involved to work its jaw and facial muscles. Even though the occlusion of its teeth is good, the teeth are not of normal size.

If proper nutrition and exercise are absent when facial structures are developing, dentition always suffers. The kitten kept on a deficient diet for 10 months has an inadequate jaw with crowded, irregular and poorly aligned teeth.

The deficient stigmata persist in the two litter mates and both die at 14 months as a result of pregnancy.

Regenerating Cats

In the regenerating cats, skull development is still deficient in the second generation with a universal malalignment of teeth. The third generation shows marked improvement and in the fourth generation, an occasional cat shows normal skull and dental development.

Chapter Five

THE EFFECT OF RAW AND COOKED FOOD ON THE CALCIUM AND PHOSPHORUS CONTENT OF BONES

"Deficient Calcification Produced by Diet: Experimental and Clinical Consideration," "Reciprocal Relationship of Soil, Plant and Animal," "The Influence of Heat Labile Factors on Nutrition in Oral Development and Health"

The calcium and phosphorus content as well as the weight and size of the femurs of normal and deficient cats are determined at death. The kittens of mother cats on raw food and on cooked food all prove to have approximately the same amount of calcium and phosphorus at birth. Quite often this is within two to three percent of that found in the mothers. See Table III.

TABLE III. CALCIUM AND PHOSPHORUS CONTENT OF FEMURS OF NEW-BORN KITTENS AND THEIR MOTHERS

	Cat Number	Type of Cat Diet	Sex	Age	Weight of Cat Grams	Weight of Femur Grams	Calcium in Femur Percent	Phosphorus in Femur Percent
A. Kittens:	a	Raw	—	1 da.	—	0.1091	10.06	6.02
	b	Raw	—	5 das.	129	0.1305	12.23	5.78
	c	Raw	F	5 das.	115	0.1451	14.25	7.15
	d	Cooked	—	1 da.	—	0.1330	11.92	6.15
	e	Cooked	F	1 da.	112	0.0829	10.79	5.49
B. Mother Cats:	al	Raw	F	13 mos.	3200	7.74	10.04	4.83
	cl	Raw	F	14 mos.	1957	8.09	12.43	5.60
	dl	Cooked	F	6 yrs.	4600	10.78	14.00	6.35

Mother of corresponding kitten indicated by subletter.

After the first two weeks, a marked depletion of the calcium and phosphorus content of the femurs occurs in the kittens. This corresponds to the period of the greatest growth. However, within two months, the bones of the kittens nurtured on raw food are approaching normal in respect to these salts while those of the kittens on cooked food lag behind. This effect is still more pronounced in the second and third deficient generations; that is, the bones of the second and third generation deficient kittens on cooked food are

during their early years of life are less able to stand the usual stresses and strains ahead.

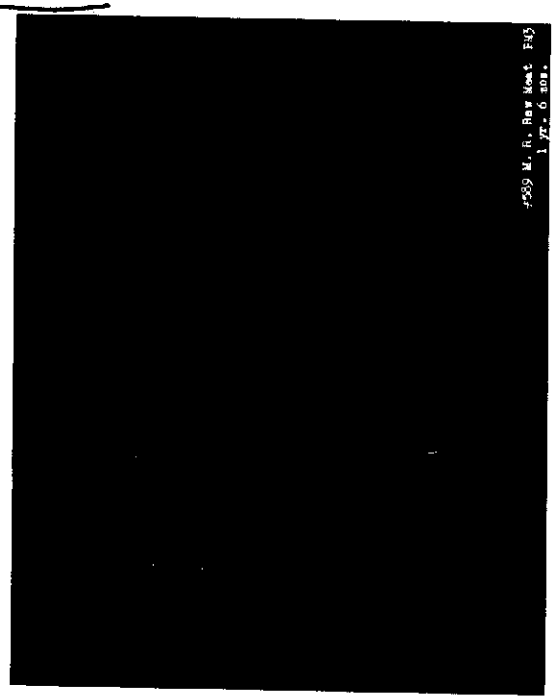

Fig. 5.3—X-ray of base of skull of regenerating male cat 589. Note lack of orbital and zygomatic arches and marked osteoporosis.

Fig. 5.4—X-ray of mandibles of regenerating male cat 589. Note marked osteoporosis and atrophy of the alveolar processes with small condyle head and poorly developed pterygoid process.

Chapter Six

ALLERGIES AND THYROID DEFICIENCY

"Non Specific Methods for the Treatment of Allergic States," "The Influence of Heat Labile Factors on Nutrition in Oral Development and Health," "Effect of Heat Processed Foods and Metabolized Vitamin D Milk on the Dentofacial Structures of Experimental Animals"

Normal cats on a raw food, cod liver oil diet show no evidence of allergy or hypothyroidism; and their offspring, generation after generation, show no evidence of allergy or hypothyroidism. The incidence of these deficiency problems corresponds with the introduction of cooked foods.

Allergies

In giving cats cooked meat and milk, they develop all kinds of allergies. They sneeze, wheeze and scratch. They are irritable, nervous and do not purr. First deficient generation allergic cats produce second generation kittens with greater incidence of allergies, and by the third generation, the incidence is almost 100 percent. When second generation allergic animals are bred after being returned to an optimum raw food diet, their allergic symptoms begin to diminish and by the fourth generation, some cats show no evidences of allergy. See Table VII.

One allergic cat reveals a condition analagous to the human disease pruritis ani, intense itching around the anus. In seeking relief, this animal rubs most of the fur off its buttocks and its physical antics leave little doubt about its extreme discomfort. When milk is removed from the cat's diet, the allergic symptom immediately clears revealing its specific allergen. Milk allergies prove common among second and third generation deficient cats and their regenerating counterparts.

One kitten develops asthma. Unfortunately, the animal dies before it is fully evaluated and before treatment is initiated. Apparently,

TABLE VII. ALLERGIES IN KITTENS

	Second Gen. Raw				Third Gen. Raw				Second Gen. Cooked				Third Gen. Cooked				Regenerating First Order				Regenerating Second Order			
	Litters	Total No. of Kittens	Allergic	Non Allergic	Litters	Total No. of Kittens	Allergic	Non Allergic	Litters	Total No. of Kittens	Allergic	Non Allergic	Litters	Total No. of Kittens	Allergic	Non Allergic	Litters	Total No. of Kittens	Allergic	Non Allergic	Litters	Total No. of Kittens	Allergic	Non Allergic
1936	2	7	0	7													2	8	6	2				
1937	3	11	0	11					3	14	5	9					4	17	13	4				
1938	7	24	0	24					4	13	4	9	1	3	2	1	3	13	3	10	2	6	0	6
1939	2	8	2	6	1	3	0	3	4	10	5	5	2	9	9	0	11	36	14	22	1	5	0	5
Total	14	50	2	48	1	3	0	3	11	37	14	23	3	12	11	1	20	74	36	38	3	11	0	11
Allergies per cent			4.0				0				37.8				91.6				48.6				0	

187 Kittens

All were 3 weeks of age or older.

Deficient cats were produced by feeding cooked meat carcass as the major part of the diet. "Second generation raw" refers to kittens born to female cats in the pens that had been on raw meat all of their life in the pens. It is possible that two of the kittens in 1939 may have been born to mothers that had been deficient when brought into pens. "Third generation raw" refers to kittens of the second generation maintained all their lives on raw meat. "Second generation cooked" refers to kittens born to female cats maintained while in the pens on cooked meat and all during their pregnancy. "Third generation cooked" refers to the kitten of second generation cooked meat cat. Regeneration cats of "First Order" refers to kittens born to second generation cooked meat cats after they had been returned to the raw meat diet for at least one year and the pregnancy. Regenerating cats of the "Second Order" refers to kittens of the regenerating kittens of the First Order.

this case of asthma is the first to be reported in the research literature.

The intestinal tracts of the allergic cats prove particularly remarkable at autopsy. Measurements of the length of the gastrointestinal tracts of several hundred normal and deficient adult cats are compared. The measurement starts at the epiglottis and includes the esophagus, the stomach, duodenum, jejunum and the colon to the rectum. In the average normal cat, the intestinal tract is approximately 48 inches long; in some of the allergic cats, the intestinal tracts measure as long as 72 to 80 inches. These elongated tracts lack tissue tone and elasticity.

Hypothyroidism

Thyroid deficiency produces marked disturbances in osseous development. An important physiologic factor in determining the bone development of infants, and later of adults, is the potency of the maternal thyroid. A disturbance in the thyroid function of the mother and/or of her ancestors shows in the anatomy of her young. Our diagnosis of thyroid deficiency in the female cat is based (1) on physical characteristics of her kittens such as prominent frontal area of the skull, small teeth, retracted lower jaw and failure of the anterior development of the face; and (2) on pathological examination of the thyroid tissue upon death.

Thyroid is a hormone known to pass from the mother into her milk and thus into her offspring. Use of supplementary thyroid in the diet of a nursing mother may produce symptoms of hyperthyroidism in her young. Among the nursing mother cats on a raw meat, raw milk diet, there are no incidences of hypothyroidism among the kittens. Among the nursing mothers on cooked diets, there is a significant number of kittens with thyroid deficiency.

Figure 6.1 compares a kitten born of a thyroid deficient mother with kittens born of raw meat and cooked meat fed mothers. Cat A (on the right) is a typically healthy male from healthy parents eating raw meat. He has a large skull, large bones, a large thorax, a large, long body and relatively short legs. His dental arches are broad and he has excellent teeth which are regular and well spaced.

Cat B (on the left) is born of a mother with a deficient thyroid. The mother has been on a raw food diet for a year preceding his birth;

B-530 C-508 A-534

Fig. 6.1—Left to right, male kittens 530, 508, and 534, all 18 months of age. No. 530, regenerating, first order, first litter, hypothyroid. Note failure in development of orbital and malar arches. No. 508, second generation, first litter cooked-meat kitten. Note smallness of head, retraction of mandible, and failure in development of orbital and malar arches. No. 534, raw-meat cat.

however, during the time she was nursing her previous litter, she developed an abscess which was diagnosed as a thyroid abscess by the character of some necrotic tissue obtained from the wound. This diagnosis was confirmed at autopsy. Though Cat B is approximately the same age as Cat A, he shows markedly inferior development. There is a failure in the development of his face so that his teeth are crowded and narrow. His skull is smaller, his thorax smaller in diameter, his body shorter and his legs longer than those of Cat A. All his soft tissues are inferior meaning that their color is pale rather than red, that their elasticity is poor, that the muscle tone is poor and that the fat is watery and white. As is typical of cats from hypothyroid mothers, he shows a much lower percentage of calcium and phosphorus in his femurs.

Cat C (middle) is an animal born of a cooked meat mother and kept on cooked meat all his life. He has a small skull, very narrow dental arch, irregular dentition, small body and long legs. He is functionally sterile and all his soft tissues are of very inferior quality.

A general finding in The Cat Study is that a correlation can be made between hypothyroidism in deficient cats and their lessened reproductive efficiency. Of the second generation deficient male cats, 83 percent prove to be functionally sterile on pathological examination; that is they exhibit no spermatozoa. Fifty-three percent of the females show underdeveloped and infantile ova.

As an example of the bizarre conditions that can be produced by long use of cooked food and by thyroid deficiency, the following kitten's history is interesting. The mother of this kitten is fed cooked meat for 18 months, placed on raw meat and bred immediately. As soon as she delivers, she is put back on cooked food. During the nursing period, she develops a thyroid abscess which is confirmed at autopsy. Of the 4 kittens born, 2 die within six weeks, 1 dies in three months, and the kitten in this example dies in eight months.

This kitten is named Streamlined because of her peculiar appearance. Her legs are bowed, her spine is distorted and she develops a pot belly which nearly reaches the ground. She has a wizzened appearance and when eight months old, she has the stature of a six week old kitten. About three months before death, Streamlined shows signs of paralysis in the left hind leg which increases in severity until all legs become involved; one week before death, she has several convulsive seizures.

Her weight at death is 1009 grams. Postmortem examination reveals an underdeveloped animal with marked rickets, curvature of the spine and a rachitic rosary of the ribs. The bladder is enormous, measuring 2.5 x 3.5 x 1 inch, and contains 110 cubic centimeters of urine. The urine accounts for more than 10 percent of the cat's weight. The bladder has pushed the intestines to the right side of the abdominal cavity to reveal a greatly enlarged colon. The femurs are soft and spongy and contain almost no cortex. Analysis of one of them shows that it contains 4.77 percent calcium and 2.42 percent phosphorus. This is 60 percent below normal for the age of the cat.

Chapter Seven

SUMMARY OF FINDINGS OF THE CAT STUDY

"Nutritional Aspects of the Orthodontic Problem," "Heat Labile Factors Necessary for the Proper Growth and Development of Cats," "Clinical Significance of the Osseous System," "Clinical Evidence of the Value of Raw Milk," "The Effect of Heat Processed Foods and Metabolized Vitamin D Milk on the Dentofacial Structures of Experimental Animals"

On controlled experimental diets we have been able to bring about developmental failure in cats. We have shown that allergic manifestations and dental disturbances comparable to those seen in human beings result from changes in food preparation.

The normal, wild cat subsists upon rodents, birds, reptiles, insects, fish and a small amount of vegetation and maintains regular features and normal functions generation after generation. Ordinary house cats, living a semi-wild life, also maintain regular features and functions generation after generation. In contrast, cats which are prevented from hunting, subjected to a life of ease and fed prepared, cooked foods show tendencies towards maldevelopment.

In one experimental study we compare two groups of cats on a base diet of raw milk and cod liver oil. The only difference in their food intake is that one group receives cooked meat and the other raw meat. The meat consists of viscera, muscle and bone, and the cooked meat is prepared as if for human consumption. Comparisons of the two groups show many differences in development.

We find animals that receive raw meat show consistent facial development and normal dentition. Even so, these animals are not quite as perfect structurally as animals that forage and obtain their own natural foods. We also find the converse to be true. Those kittens that receive cooked meat instead of raw develop all types of malformations of the face, jaws and teeth.

Adult cats which forage until they reach their maximum develop-