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Feeding practices seem to have shifted as a result of marketing forces, rather than our profession’s recommendations. I will show how cats have been fed historically (with a bias to Australia), and why changes in feeding practices have occurred. Finally, I will touch on how “big cats” are fed in captivity, and provide recommendations for feeding domestic cats at different life stages.

How cats have been fed in Australia
During the 1960/70s cats were fed a mixture of table scraps, raw beef and offal (e.g. raw bovine heart and liver). Fresh rabbit was popular. Tinned food was all fish and not commonly fed. It was recommended that kittens be fed strips of raw beef supplemented by CaCO₃ powder, plus liver and vitamin A weekly. Special recipes were recommended for pregnant and lactating queens.

Commercial food was introduced in the 1970s. Canned foods based on meat, meat by-products, offal and/or fish and extruded commercial kibble became available at supermarkets and pet stores. Most authorities recommended feeding a mixture of these “nutritionally complete” foods. “Pet meat/mince” also became available from pet stores and supermarkets. This was typically based on kangaroo meat (preserved with sulphites), or other meat or meat by-products unsuitable for human consumption, and was relatively inexpensive.

Nutritional diseases referable to diets that were not nutritionally “complete” are still seen today, but much less commonly than they were in the 1960/70s. These include nutritional secondary hyperparathyroidism (when meat diets high in phosphate but low in calcium are fed to rapidly growing kittens), hypervitaminosis A (from diets rich in liver), pansteatitis (from diets high in polyunsaturated fats, e.g. certain fish, without sufficient added antioxidants), thiamine deficiency (from sulphur dioxide in meat treated with sulphite preservatives, fish containing thiaminases or meat cooked without providing supplementary thiamine).

In the late 1980s/1990s, “Premium” (predominantly dry) and “Prescription diets” became increasingly available, widely endorsed and sold by veterinarians. Indeed, they were initially available only through vets. Hills, Iams, Walthams/Royal Canin and Nestle Purina are the major manufacturers. These dry foods generally use high quality animal protein, typically in larger proportions than in supermarket brands, with a higher fat content. They are exceedingly palatable, produce a small volume stool and seem “addictive”. **People generally fail to follow the manufacturer’s recommendations, or even worse, feed them ad libitum.** Cats require only small amounts of these diets for maintenance energy requirements – less than people are accustomed to feeding. The ration is consumed so quickly and with so much relish that cats do not seem satiated. Accordingly, they “complain”, vocally and via their behaviour, that they have not received enough food! Undisciplined owners respond by providing more food and thus these diets have contributed to obesity in cats.

Commercial foods have been associated with other diseases. Experimental studies showed that cats fed certain commercial diets, commercial dog food, or vegetarian diets develop retinal degeneration due to taurine deficiency. This was rare in the pet population because of the amount of fresh meat fed in Australia. Dilated cardiomyopathy was later shown largely attributable to feeding diets marginally deficient in taurine. **Again, it seems that the rarity of this condition in Australian cats was due to easy access to fresh meat, fish and animal by-products (all rich in taurine).**
Epidemiologic data suggested an association between commercial food and hyperthyroidism. Feeding dry food was associated with idiopathic cystitis and urethral obstruction, especially if the ash content was poorly constituted. There has been an abrupt increase in the prevalence of “blocked cats” in Thailand since the introduction thereof of commercial dry food. In the USA, there was an increase in the number of oxalate uroliths diagnosed in the bladder, urethra and ureter attributed to feeding acidifying dry food diets. Odontoclastic resorptive lesions were rarely seen in the 1960/1970s, but became increasingly prevalent in the 1980s. Allergies manifest as “miliary dermatitis”, “eosinophilic granuloma complex” and “inflammatory bowel disease” were rarely seen in the 1960/1970s except when cats were fed fresh or canned fish, but became more prevalent when commercial food was introduced.

More recently, the importance of the protein content of a diet and its glycaemic index has been shown to be critical in relation to obesity, fat metabolism and the predisposition towards diabetes mellitus. Cats that become obese, especially when fed a high carbohydrate ration, are at risk of developing insulin resistance, glucose toxicity, “transient” and eventually permanent diabetes.

Many experts believe there is an association between the feeding of these diets and the sporadic development of hepatic lipidosis, should such cats develop intercurrent disease associated with anorexia, e.g. pancreatitis. The increasing prevalence of hepatic lipidosis in Australia seems to have paralleled the market penetration of these premium diets. In my view, obesity contributes to degenerative joint disease, because when an athletic animal jumps and lands (often onto hard ground, taking most weight into the forelimbs) there is an increased load on the joints, predisposing to damage and an increased risk of developing osteoarthritis.

Finally, there have been some recent substantial issues with toxicity referable to additives (melanine, cyanuric acid), aflatoxins and irradiation of commercial food and “treats”.

**Re-emergence of the view that ‘natural’ foods are necessary**

In the 1990s, a group of veterinarians (e.g. Dr Tom Lonsdale) helped remind our profession and the general public that cats were obligate carnivores, and that they did better when fed more “natural” food such as chicken wings, drumsticks, lamb shanks, chunks of uncut red meat, and the like. Although there was a strong emphasis on texture in relation to periodontal health, the “raw meaty bones lobby” provided cogent arguments that fresh meat by-products “on the bone”, containing skin and connective tissues, were also an important source of micronutrients. Food was eaten slowly and with effort, rather than being gulped down. Presumably this results in a lesser post-prandial alkaline tide. There is more tenacity about possession of food when such diets are provided, and without doubt cats are more satisfied at the completion of a “natural meal”. Effort extended in chewing, gnawing and consuming the ration provides exercise for the gums, periodontium and masticatory muscles (and indeed for the whole cat). The natural self-cleaning action of stripping flesh from bone reduces tartar accumulation and promotes good gingival and oral cavity hygiene. Even tearing apart long strips or chunks of meat achieves this end.

It seems that the influence of these veterinarians had an impact on manufacturers worldwide - some responded with diets requiring more chewing (e.g. Hills T/D™) or with additional products designed to achieve the same end (e.g. Greenies™). Interestingly, there has been a recent trend in the North American literature to re-assert the importance of feeding cats as obligate carnivores – with a requirement for high protein content in the ration. Articles like Zoran’s reviews on “the carnivore connection” testify to a paradigm shift in thinking in feline nutrition. It also behoves us to remember Pedersen’s notion that
cats, as a species, are “subclinically dehydrated”. Feeding an entirely dry ration is therefore “looking for trouble.”

**The increasing role of multinational manufacturers in nutritional research**

The majority of nutritional studies in cats are conducted by or funded by multi-national manufacturers. Although these studies are often of the highest standard, and conducted by researchers of the first order, concern must arise as to bias entering the literature when manufacturers are pivotal in establishing research agendas. Food companies expend considerable effort in providing nutritional information to veterinary students, our profession and new cat owners. In my opinion, the information they present is often commercially driven but cloaked as scientific dogma. Finally, these companies employ some of the most qualified veterinary internists in the world to espouse the virtues of their products.

There is therefore an unfortunate conflict of competing interests – commercial and academic – which has muddied knowledge concerning feline nutrition. Many veterinary researchers in academia interested in small animal nutrition or gastroenterology receive substantial grant support from these manufacturers. Unfortunately, little money is available to support independent nutritional research and such research is inherently expensive because it requires animals to be housed, fed and maintained for a very long time. For these reasons, little is being done to compare the nutritional impact of commercial versus natural diets. A recent paper published in the *Journal of Feline Medicine and Surgery* suggested that the mean lifespan of cats fed exclusively on commercial cat food in a pristine research facility with regular veterinary attention was less than 12 years, with death largely attributable to renal failure or neoplasia. My experience is that cats fed a more natural diet should live in excess of 14 years on average.

There have been important and worthwhile contributions of pet food manufactures especially in relation to the provision of "prescription diets" for the treatment of a wide range of conditions. However, while the contribution made by these manufacturers to knowledge of feline nutrition is acknowledged, it behoves us as professionals to ensure that our expertise is not compromised by too close an association with organisations that have commercial interests in the outcome of research. Rigorous independent research is the only way to ensure this.

**Teleology and “big cats”**

Finally, we need to think about the likely natural diet of cats. Wild cats would likely have eaten predominantly small mammalian prey, such as rodents and rabbits, as well as birds and insects which are present in the stomach contents of feral cats killed by commercial shooters. Fish would not be a natural food item for cats and neither would they likely scavenge larger prey such as the ruminant species. Rabbits would provide for a large meal, followed by a period of rest for digestion. On the other hand, rodents and small birds would likely be devoured quickly, with the cat soon moving onto the next meal. Small prey would be almost totally consumed – flesh, bones, gut and ingesta. Rabbit would be nearly totally consumed, except for part of the pelt and the head. In contrast, big cats generally eat intermittently, feasting on a large carcass that requires digestion over a substantial period. They would eat meat, bones, guts and their contents, according to hierarchal considerations. It might be self evident, but in the wild, food is entirely raw.

In zoos and game parks, attempts to feed large cats artificial man-made diets have resulted in a variety of disease issues, especially in relation to poor periodontal health. Fitch & Fagan (1982) conducted a survey which revealed that of captive cheetahs a wildlife park fed a formulated diet, 75% had perforation of the palate by the lower molars. In contrast, individuals fed animal carcasses lacked this condition. Various authors have
commented that cheetahs fed “natural diets’ also seemed behaviourally more content, with less stereotypic behaviours e.g. pacing. Feeding natural food represents a form of environmental enrichment.

Recommendations for feeding cats

1. **Kittens should be fed largely a commercial premium cat food.** A combination of canned food and dry food is ideal. Commercial premium dry kitten food is calorically dense and the best way to achieve rapid growth. Small meals are tolerated better than large meals. Milk should not be given.

   Kittens need to be introduced to different tastes, flavours and textures, but changes in the diet should be gradual. They should be introduced to bone gnawing as early as possible after weaning, during the critical stage when their eating habits are evolving and peer competition for food is strong. **Raw food should be introduced several times a week in place of the normal ration from about 12 weeks of age** – to expose them to the taste and texture of things like chicken wings and lamb cutlets. But raw food should make up less than 10-20% of the total food intake over the course of a week. Chicken wings should be fed only when fresh (i.e. the day of delivery to the local butcher or supermarket). Lamb cutlets can be fed raw, or after freezing and thawing (to kill *Toxoplasma* zoites). The critical thing at this age is to give a varied ration with an ideal calcium to phosphate ratio. The *Campylobacter* and *Salmonella* organisms present on chicken skin are well tolerated by the gastrointestinal tract of kittens and cats, but the owners should wash their hands for *their* hygiene after meal preparation. Coccidiosis, ascarids and *Giardia* infections are common in this age group and often require treatment.

2. **Young adult cats older than six months should be fed more natural food. Ideally cats should get approximately 30 to 50% of their food from “natural” material that needs chewing to be ingested.** This needs dedicated owners, and the utilisation of the patio, shower recess, backyard or laundry as a feeding platform.

3. **Dry food should be phased out completely at this stage for the reasons outlined above. Meat based canned food can be fed.** I favour tins in which you can see muscle tissue when you open the can, rather than the puree styles where offal and other material floats in “jelly”.

   Young adult cats are active and burn up calories. They need something in the order of 85 to 100 grams of canned food, or more, twice daily. This can be replaced by a chicken wing, a chicken drumstick, a lamb shank or two cutlets, or a piece of osso-bucco. Some active cats need even more. One lamb shank has enough food to keep a young adult cat satiated for 24 hours – if they chew it to the bone.

4. **Older cats should be fed like younger cats, but reduced quantities because they are less active and not growing.** Cats older than 10 years need a lower caloric intake than active youngsters, until they develop renal insufficiency when things change. Being obese increases arthritis issues and causes a shorter lifespan in most species where this interaction has been well studied (e.g. rat, dog, humans). So, keep cats lean!

5. **Free access to water is mandatory.** Some cats prefer water that is running. Some cats don’t like chlorine – so fill up the cat bowl with water from the kettle after it has cooled down (boiling ‘blows off’ much of the chlorine).

**Final comments**
Cats fed natural food as a large part of their ration have less tartar and periodontal disease progresses more slowly than in cats provided exclusively with commercial food. However, cats develop gingival recession as a part of the aging process, and may still get “neck” lesions. Periodic dental attention is important to prevent oral cavity inflammation, which possibly contributes to an increased risk of cancer and renal disease. This is especially important as it permits old cats to continue to have the health benefits of a natural diet. Grooming cats on a daily basis with a metal comb, or Zoom Groom®, especially older cats, is important as hair causes large bowel issues (predisposing to constipation, “hair colitis” and even megacolon) and irritation to the stomach (resulting in hair balls, “hair gastritis” and vomiting).