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WORLD HUNGER: Another Animal Protein Possibility

by Richard Marshall, DVM

The world population before the nineteenth century was under one billion and early in the twentieth century it was under two billion. It is now approaching seven billion. The World Health Organization estimates that one-third of the world is well-fed, one-third is underfed, and one-third is starving. Over twenty four thousand deaths per day call to the conscience of the world for solutions to manage this accelerating population, but the fact remains that more people require more food. International efforts have centered around the development of acceptable hybrid plants and animals that would meet this end.

The animal resource is of particular interest because of its high quality and preferred protein. Several species of cattle, sheep, goats, pigs, rabbits, chickens, and fish are being studied and tested as to their adaptability and usability. There are problems with all species, the greatest being the amount and availability of the feed needed for their production and their inability to withstand rigorous environments. Attention is now turning to other animals which could provide for the protein needs of the hungry.

The ideal animal would be one that meets the following requirements:

1. Worldwide availability
2. Worldwide adaptability
3. Worldwide acceptability
4. Low investment cost
5. Low maintenance cost
6. Minimum housing
7. Minimum handling
8. Forages for its food
9. Finds its way home
10. Durable by nature
11. Disease resistant
12. Efficient parents
13. Efficient products
14. High protein source
15. High producer
16. Long life span

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- 17. Long reproductive life
- 18. Easily domesticated
- 19. Easily prepared
- 20. Entirely useable

Surprisingly, there is one species of animal that meets nearly all these requirements and yet is overlooked as to its potential as a protein source. There are less than a few dozen current books dealing with this animal species, but none consider it as a worldwide food source. Several articles deal with its interesting aspects, but science has largely neglected it. Perhaps it is too common and too ordinary, but the potential of the domestic pigeon remains unexamined.

The Citizenship of the Pigeon

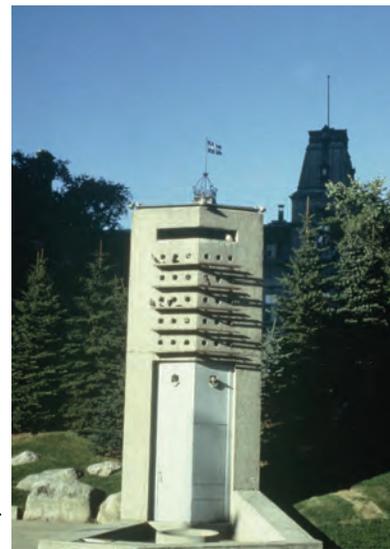
The domestic pigeon (*Columbia livia domestica*) lives in feral flocks in most towns throughout the world. It was introduced into most areas by man and is socially inclined to live in areas populated by man. Truly a citizen of the world, the pigeon is usually available in abundance (Figures 1,2). This cosmopolitan characteristic proves the adaptability of the pigeon. It may be found North of the Artic Circle, West in the high cities of the Andes, East in the tropics of Malaysia, and even in the Southernmost town in the world, Ushuaia, in Tierra del Fuego. What else could survive and thrive in such diverse geographies, different climates, and in the most difficult circumstances?



Figure 1: Under the statue of Horatio Nelson, the center of attention in London's Trafalgar Square is the common street pigeon which maintains itself mostly on bread crumbs.

The acceptability of an animal as a food source is most often a case of familiarity which varies greatly from one locale to another. The European snail, the South American

Figure 2: "Le Pigeonnier" is a pigeon aviary (dovecote) located in Quebec City, Canada, used as a public recreational area and to control their pigeon population.



guinea pig, and the African grass cutter remain delicacies in their respective parts of the world, but their introduction into other countries will remain slow because they are so "non-traditional". But the young pigeon squab remains a culinary delight in the finest restaurants of France, in the kitchens of China, and on the dinner tables of Egypt. There are few social barriers to overcome; the pigeon remains a sought after food source.

The Cost of the Pigeon

Traditional animals, such as cattle, sheep and goats, represent a major investment to their owners whose wealth is represented by them. Whether it is the Masais of Kenya or the Bedouins of Arabia, the welfare of these people is directly related to the welfare of their herds and flocks. As their animals go, so go these people.

The greater the investment, the more expensive it is to protect that investment. The larger the food animal, the larger the maintenance costs. The provision for these animals remains in direct proportion to their size; so it is with our conventional farm stock.

In the past, most research has emphasized the development of the larger animals, but with bulging populations, less available land and resources, the importance of smaller animals is evident. The ordinary and over abundant pigeon remains an untapped resource of the lowest cost and maintenance for all people, especially the poor.

The Care of the Pigeon

Relative to costs are the problems of rearing animals. Larger animals require larger facilities and feeding areas. The world's small farmer usually has less than a hectare of land in which to produce his food. Minimal land mandates minimal housing.

Historically pigeons have been housed in every conceivable type of structure, from the caves of the Middle East (Figure 3) to the ornate pigeon towers of Europe. Individu-



Figure 3: The carved pigeon caves of Goreme Valley, Cappadocia (Turkey), are centuries old and owned by families. These birds are valued for their production of fertilizer used in gardens.

als have raised pigeons in their barns and attics as well as in wall-hung crates and pottery. Each pigeon needs a cube of no more than 30cm on a side (Figure 4). Obviously great numbers of pigeons can be raised in relatively small areas.

The pigeon takes care of itself. Its needs are modest with security uppermost in its mind. It enjoys access to and from a shelter that is free of excessive drafts and moisture as well as rodent and insect harassment. If good water sources are scarce, then the provision of clean water makes its home complete.

Except for the inducement of having the pigeon live where we want it to live, the pigeon is self-sufficient and requires little, if any, help in the administration of its daily affairs. Once established, pigeons may be supervised and harvested by women or children as is the tradition with animal care in many lesser developed countries.

Figure 4: Simple nest boxes with individual compartments are easily constructed with sliding trays for ease of cleaning. This construction material is plywood, but almost any material may be used.



The Competency of the Pigeon

Perhaps the greatest attribute of the pigeon is its ability to forage for its food and find its way home. Compare other animals to this bird. What can range out so far and yet has

the homing instinct of the pigeon? Most other animals must be fed or moved in order to feed which means continual oversight.

The pigeon chiefly feeds on the seeds of cereals, legumes and weeds, but will eat herbage, fruit and some invertebrate animals. The street pigeon will eat scraps of meat and cheese as well as bread crumbs and almost any other artificial food.

All animals in some way or another compete with man for food. History records that during feudal times in England and France, the lords allowed their pigeons to ravage crops of their vassals. These lords maintained pigeon houses called dovecotes which contained thousands of birds. The problem existed because of the selfishness of the lords and the inability of their servants to take counter measures. With proper management, the pigeon can thrive on foods that are unusable to, undesirable for, and left over from man.

The Constitution of the Pigeon

The fact that the pigeon lives anyplace testifies to its durability. The progenitor of all domestic pigeons is believed to be the Rock Pigeon. Today, this bird is found from the British Isles, throughout North Africa, and as far East as Mongolia. A few of these regions claim some of the worst climates in the world. Evidence suggests that the Rock Pigeon evolved in arid and nearly treeless regions and that it spread into other parts of the world. Desert areas of North Africa and the Middle East are often areas of famine, and yet, they are home to the pigeon. This adds greatly to our confidence in the protein potential of the pigeon.

Adding to its durability is the pigeon's ability to escape from its predators, namely hawks and falcons. Although defenseless, its means of escape by flaring, diving, and hiding make it a difficult target. This is coupled with its high tolerance to insects as well as external and internal parasites, its resistance to them is evident in its generally low morbidity and mortality to which few other species can compare.

The Consistency of the Pigeon

Pigeons are monogamous until the death or long term removal of their mates. Both sexes take complete and equal parts in the nest building, incubation of the eggs, and care of the young. This dedication to each other and responsibility for their young is the prime reason they are so faithful in their homing, and why they will race from far distances in short periods of time.

Hens lay two eggs per clutch. Eggs are about half the size of regular chicken eggs. The incubation period is seven-

teen to nineteen days which is relatively short in comparison to chickens (20-21 days), turkeys and ducks (26-28 days) and geese (30-33 days).

The squab production of the pigeon is a picture of efficiency. Under ideal conditions, it would be possible for a pair of pigeons to produce two eggs a month and raise twenty-four squabs per year. Obviously, this does not occur because of varying conditions, but half this number is possible. Contrast other animals to this ease of management with such a high rate of return.

The Capability of the Pigeon

Pigeons can reach sexual maturity in five months and produce edible squabs in approximately twenty-six to twenty-eight days after hatching. A young pigeon squab, depending upon type and conditions, will weigh between 340 to 680 grams. The growth rate in this four week period is phenomenal. Commercial squabs weighing less than 30 grams at birth, double their size within the first forty-eight hours of life, grow so rapidly that it can readily be seen from day-to-day, and in less than one month, when completely picked and prepared for consumption, present approximately 500 grams on the table! This speed of growth is unequalled by other market birds or animals.

During the first seven to ten days of squab's life, it receives a substance called "milk". Both male and female pigeons produce this nutritional "milk" that is high in fat and protein from their crop lining. The male pigeon or dove is the only known mammal or bird to create a "milk". This capability of both sexes contributes greatly to the success of pigeons in their struggle for survival.

The Continuity of the Pigeon

A common misconception is that all birds have short life spans. Such is not the case and especially not in pigeons, since they commonly live fifteen to twenty years. Their reproductive life is prolific in the first six or seven years of the female and double that in the male. Such a long life span and reproductive life has helped securely establish pigeons in this world.

Credibility of the Pigeon

As mentioned, in many countries women and children tend the livestock; therefore, it is important that their animals be non-dangerous and easily domesticated. Few animals could predate in antiquity the domestication by man of this bird. Adaptation to and being part of man's social environment is in fact the norm. Other than taking flight, the pigeon's only defense is harmless pecking or wing slapping. As a member of the dove family, its innocence is further recognized as the worldwide symbol of peace.



The hybrid vigor of the pigeon makes it highly resistant to disease, and it poses only a minor disease risk to man. Public health concerns are often associated with pigeons, but diseases transmitted by pigeons to either man or other animals are few (i.e. avian chlamydiosis and cryptococcosis). Claims of bacterial or fungal infections from the pigeon droppings are often undocumented and undeserved, and the low incidence of these diseases in pigeon breeders and hobbyists bears this out. The pigeon is not considered to be a carrier of the West Nile virus, nor has it been shown to have played a role in the transmission of the avian influenza virus to humans.

In a world in which large populations suffer from malnutrition and undernutrition, the pigeon offers a meal of exceptional worth. It is easily killed and quickly prepared for cooking. Because of its size, what is killed can be consumed, and the need for refrigeration or preservation is eliminated. Since squabs are consumed before using their muscles, their meat offers a large proportion of digestible protein and a smaller proportion of connective tissue than most meats. The meat is moist, delicious, extremely tender, and a good source of vitamins and minerals. Pigeon eggs also present a very rich and digestible protein.

The pigeon is entirely usable. Its feathers are superb insulators in clothing or bedding. Pigeon fertilizer is excellent and highly valued for farming and as an income source.

The Contributions of the Pigeon

The pigeon is even more unique in that it offers mankind two more benefits: companionship and a means of competition.

Without question, whether in a city park or in a backyard loft, the pigeon provides all people a source of entertainment, study, and solace. The price in the park is a few bread crumbs; whereas, the fierce competitor may invest indulgently in his birds. With well over two-hundred domestic breeds, the serious hobbyist may raise and show his fancy birds.

Since ancient times, men have relied upon the speed and dependability of the pigeon to carry messages. Early in the nineteenth century the English and Belgians began to race their birds. Today, many nationalities enjoy their comradery as they compete their pigeons over courses ranging up to one thousand kilometers which are flown in one day.

The Challenge of the Pigeon

The ordinary pigeon has extraordinary attributes to which few other animals can compare. The last challenge remaining is to prove in practice that it is an ideal food source. It is hoped that any community that has the need and desire will develop the protein of the pigeon for its people.

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Note: Best web search site: Pigeon Associations (around the world)

The author, Dr. Marshall, serves in a number of roles, including Director of Research (surgical) Laboratory Services, Sutter Institute for Medical Research; Director of Veterinary Christian Foundation; and Campus Veterinarian, California State University, Sacramento. Dr. Marshall has been raising pigeons since 1987.

UPDATES

Top 10 Human Medications That Poison Our Pets

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Editor's note:

Though IAHN primarily focuses on large (farm) animals, there are times when a special article, such as this one on pets, can be useful to our readers. This article relates to a common problem in pet-owning households: misused or accidental ingestion of human medication in "companion" animals.

Although pet parents are well aware of poisons lurking around their home, many don't realize that some of the biggest culprits are sitting right on their own nightstands. In 2007, the ASPCA Animal Poison Control Center received 89,000 calls related to pets ingesting over-the-counter and prescription medications. To help you prevent an accident from happening, our experts have created a list of the top 10 human medications that most often poison our furry friends.

If you suspect your pet has ingested any of the following items, please call your veterinarian or the ASPCA Animal Poison Control Center's 24-hour hotline at (888) 426-4435. And remember to keep all medications tucked away in bathroom cabinets—and far from curious cats and dogs.

NSAIDs

NSAIDs (non-steroidal anti-inflammatory drugs) like ibuprofen or naproxen are the most common cause of pet poisoning in small animals, and can cause serious problems even in minimal doses. Pets are extremely sensitive to their effects, and may experience stomach and intestinal ulcers and—in the case of cats—kidney damage.

Antidepressants

Antidepressants can cause vomiting and lethargy and certain types can lead to serotonin syndrome—a condition marked by agitation, elevated body temperature, heart rate and blood pressure, disorientation, vocalization, tremors and seizures.

Acetaminophen

Cats are especially sensitive to acetaminophen, which can damage red blood cells and interfere with their ability to transport oxygen. In dogs, it can cause liver damage and, at higher doses, red blood cell damage.

Methylphenidate (for ADHD)

Medications used to treat ADHD (Attention Deficit Hyperactivity Disorder) in people act as stimulants in pets and can dangerously elevate heart rates, blood pressure and body temperature, as well as cause seizures.

Fluorouracil

Fluorouracil—an anti-cancer drug—is used topically to treat minor skin cancers and solar keratitis in humans. It has proven to be rapidly fatal to dogs, causing severe vomiting, seizures and cardiac arrest even in those who've chewed on discarded cotton swabs used to apply the medication.

Isoniazid

Often the first line of defense against tuberculosis, isoniazid is particularly toxic for dogs because they don't metabolize it as well as other species. It can cause a rapid onset of severe seizures that may ultimately result in death.

Pseudoephedrine

Pseudoephedrine is a popular decongestant in many cold and sinus products, and acts like a stimulant if accidentally ingested by pets. In cats and dogs, it causes elevated heart rates, blood pressure and body temperature as well as seizures.

Anti-diabetics

Many oral diabetes treatments—including glipizide and glyburide—can cause a major drop in blood sugar levels of affected pets. Clinical signs of ingestion include disorientation, lack of coordination and seizures.

Vitamin D Derivatives

Even small exposures to Vitamin D analogues like calcipotriene and calcitriol can cause life-threatening spikes in blood calcium levels in pets. Clinical signs of exposure—including vomiting, loss of appetite, increased urination and thirst due to kidney failure—often don't occur for more than 24 hours after ingestion.

Baclofen

Baclofen is a muscle relaxant that can impair the central nervous systems of cats and dogs. Some symptoms of ingestion include significant depression, disorientation, vocalization, seizures and coma, which can lead to death.

EDITOR'S NOTE: *The eradication of a disease, whether it is a disease of animals or humans or both, is a signal event in history. Many factors play a role in an eradication effort including how complex the disease is, whether major death losses and/or debilitation are a part of it, its methods of spread, what insect or physical vectors might be involved, whether there is a chronic carrier state involved, whether reproductive problems are a part of it, whether other species are involved in its spread or survival, how long the causative organism lives in the environment and whether there is an effective vaccine available. Politics and economics are also a major part of the process.*

Rinderpest Nearly Eradicated Worldwide

A disease that killed many cattle and contributed to the development of modern veterinary medicine could soon be the first animal disease eradicated by human efforts according to the World Organization for Animal Health (OIE). The OIE announced June 17 that 176 countries and territories were currently recognized as free of Rinderpest, but that 16 countries and some additional territories needed to be recognized as free of the disease prior to a declaration that the "cattle plague" had been eradicated. The viral disease affects domestic wild hooved animals, particularly cattle, buffaloes, yaks, swine, giraffes and lesser kudus.

Rinderpest is one of the oldest recorded plagues of livestock, originating in Asia and first described in the fourth century according to the book "Veterinary Virology". Devastating epizootics swept across Europe in the 1700s and 1800s and a 1920 outbreak led to the founding in Paris of the Office des Epizooties which later became the OIE. "Rinderpest was a devastating disease of cattle in Europe before it was finally eliminated in 1949" the book states. It has been a scourge in in sub-saharan Africa ever since livestock farming was introduced in the late 1800s by massive cattle vaccination programs, but regional wars and violence interceded, programs were stopped, and the disease made a rapid comeback in many areas."

The Food and Agricultural Organization of the United Nations has since its foundation helped member countries control Rinderpest. In 1994 the organization worked with OIR in launching FAO's Global Rinderpest Program which

has helped control animal movement, eliminate infection reservoirs and conduct surveillance, the FAO states.

Rinderpest could become the next disease, following Smallpox in humans, to be eliminated through human efforts and the eradication would follow centuries of efforts to control or wipe out the disease. Harm from Rinderpest in the mid-1700s has been credited with helping to show French authorities the need for individuals trained to respond to animal disease outbreaks and contributed to the French comptrollers support for a proposal to found the world's first Veterinary School in Lyon, France, according to the book "Virus diseases of Food Animals."

The morbidity-death rate following infection typically approaches 100 percent although cattle breeds indigenous to Africa have mortality rates typically between 90 and 100 percent and the mortality rate of about 50 percent the book states.

The OIE announcement was published about four months after the death of Dr. Walter Plowright, a British veterinarian who developed a vaccine credited with greatly helping to eliminate the livestock disease.

This special news note written by Greg Cima appeared in Vol 237, No 3 of The Journal of the American Veterinary Medical Association, August 1, 2010.

Answers to Readers' Questions by the Editor

An Overview Of Fire Ant Problems and Some Low Cost Control Practices

A reader in Sierra Leone writes about Fire Ants in his goat pen. He is worried about the fire ants effect on his goats and mentions that his chickens are eating fire ants and that he sprinkles kerosene around the floor of the goat pen. This raises several questions.

Q: Do the fire ants damage the chicken that eats them?

A: I am not aware of any damage to the chickens but have almost no information on it. It would seem that if chickens were harmed they would avoid the ants. Apparently the scaly type skin on the legs of some birds prevents damage from the ant bites. Also the baby chicks would be more likely to be harmed and I would keep them away from the ants.

The ants certainly can damage goats because the ants can cause serious bite wounds to the areas without much hair or that have thin skin. I have seen baby pigs and nursing sows with severe wounds when the sow lies down on or near the ant bed.

In the case of ant beds near where chickens and animals are kept I would keep the animals some distance from the ant beds. Baby animals are very curious and will explore new areas and possibly be harmed. I am not aware of Kerosene being of any help in killing off the ants or beds.

Fire ants are found in a very large part of the world; from the warmest to at least moderate frost zones. The major problem seems to be that the worker and scout ants can be killed fairly easily but not the queen who lays the eggs and is safely situated several feet below the surface of the ground and chemicals poured on the ground do not harm her.

In order to kill the queen it takes an insecticide/bait combination that the worker ants take to the queen for food and it kills her. The combination poison/bait is expensive and often not available in rural areas. Like other farm supplies it is less expensive per unit when purchased in a large quantity and at times larger farmers will help with this or small farmer groups will purchase it in larger quantities and divide among their group. There are many less expensive chemicals that will kill worker and scout ants but not the queen and soon more ants appear.

Also the ants have a tendency to build mounds in surrounding woody or brushy areas that we do not see until we burn or clear those areas and soon ants from those areas spread and become a problem for farmed areas where the ants had been previously controlled..

Of course finding non-chemical means of controlling fire ants is a high priority for almost everyone in affected areas and information on the subject is very limited. Texas A&M University in the USA and its agricultural researchers and faculty (especially the Cooperative Agricultural Extension Service) have probably done as much on this as anyone.

They have obviously studied the life habits of these ants extensively and from those studies have come up with some management practices that are a help and inexpensive and easily carried out by owners and helpers.

A big part of that is the fact that understanding their fanatical search for food to feed the queen and the colony are the major part of their life function. Also along with the great search for food is their search for water, especially in dry seasons. Any interruption in their having an adequate supply of food and water has to create problems for the health and productivity of the colony and lessens the number of ants to create problems.

The knowledge about their extreme fanaticism about locating food and water, while not a major part of the solution, is extremely important, especially for those who cannot

afford chemical poisons and are willing to carry out the suggested practices.

Those practices that emphasize keeping the ants away from food and water can be a great help in controlling this problem. This information alone, when people use it along with their native intelligence and imagination can be a big help in controlling the ants and their damage to humans and animals if people use their collective imagination.

Almost any feed ingredient or complete feed that any animal, bird or fish or rodent or human can consume is attractive to fire ants. This means that anywhere that animals or humans live or store food will be found by fire ants if they are in the area. It doesn't have to be fresh. In fact the fire ants will consume it whatever the state of freshness or non-freshness it is in including the larval stages of house flies and other insects found around manure and they will build their colonies nearby.

Fire ants are attracted to wasted or leftover food almost anywhere, in cracks or crevices in troughs and other feeding areas and food spilled onto ground or floors, even in small amounts., around and at times in homes and even where pets are fed.

Keeping areas clean where cages and food preparation and storage areas are located makes them less attractive to the ants. Trash of any kind usually contains at least some kind of food that attracts the ants. By keeping the premises clean and free of trash, ants are less likely to enter an area. Storing food in ant-proof containers such as jars, cans, barrels and other closed containers are a big help as ants will soon avoid areas where there is no food source.

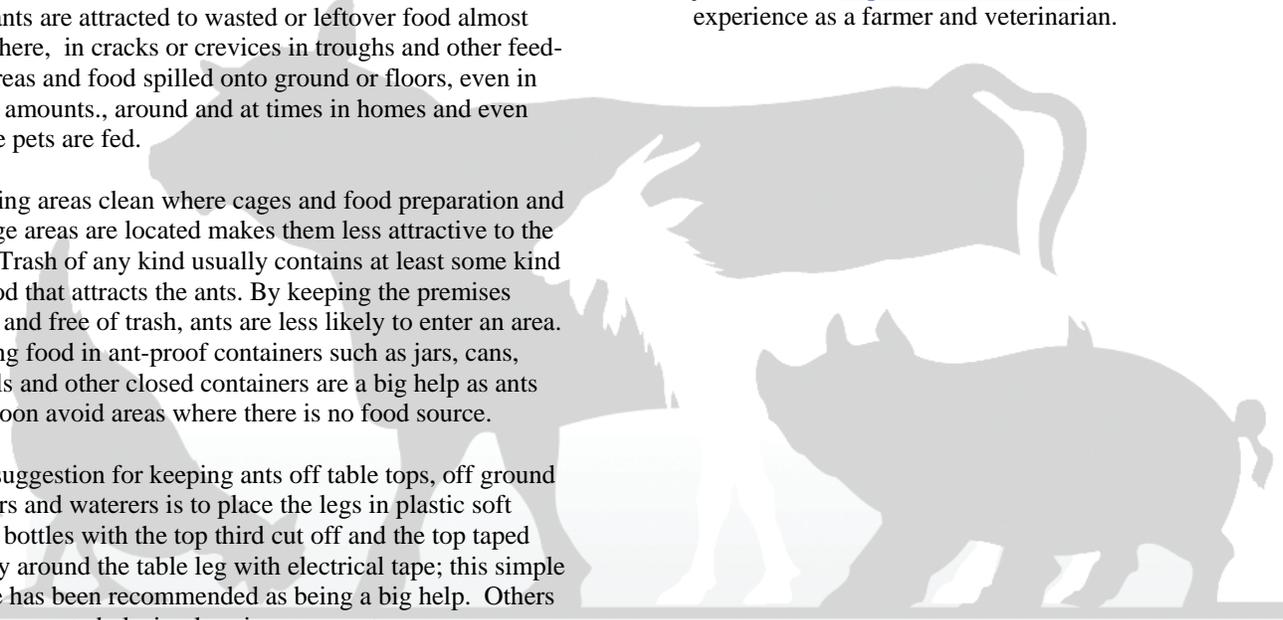
One suggestion for keeping ants off table tops, off ground feeders and waterers is to place the legs in plastic soft drink bottles with the top third cut off and the top taped tightly around the table leg with electrical tape; this simple baffle has been recommended as being a big help. Others have suggested placing legs in soapy water.

All of this gives us things to consider in controlling the ant problem but it is also a way to control food wastage and spoilage that can lead to problems for humans and animals. Food spoilage can be a factor in survival of many germs that cause problems for humans and animals. Many of the same factors that favor ants being attracted also favor rodents, rats and mice, that carry diseases and eat and spoil food. Reducing the amount of chemicals that need to be used in control of the ants is a major factor. Remember that almost any chemical can cause problems. Read and follow directions very closely. Fire ants cause a number of problems for humans when they come in contact with ant mounds or trails or sources that have attracted ants. When

bitten by the ants, especially large numbers of bites, they can suffer from multiple stings that may be medically serious. Reactions to the bites can be serious, especially when there are multiple stings and when stings occur often. This is especially true of barefoot children and stings on hands and arms when harvesting vegetables and other foodstuff including fruits as the ants can climb vines and trees.

We would welcome any suggestions from readers for any control methods that do not depend on expensive chemicals. In the case of other problems, basic home remedies or changes in farming practices have helped. We would appreciate hearing about them; even if they only help a little.

This information came from an article "Protecting Penned Animals From Fire Ants" by Nathan L. Riggs-IPM (Fire Ant Project), Bexar County and Bastiaan M. Drees. Prof. and Extension Entomologist and The Texas Fire Ant Project web site: <http://fireant.tamu.edu> And from the editor's experience as a farmer and veterinarian.



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