CHAPTER 1

The History of Rabbit Keeping

Among the major species of domesticated animals, rabbits were rather late to the party.

The fossil record of rabbits and their ancestors is a bit of an anomaly. There are more distinct species in the fossil record than exist in the living world today. New techniques in recovering fossils have no doubt contributed to scientist's ability to recover the delicate bones and teeth that identify the ancestors of our modern rabbits.[1]

But it is without a doubt that one of the most widespread species of rabbit in the world is the European wild rabbit, also known as *Oryctolagus cuniculus*, the ancestor of our modern domestic rabbit.

In Europe, rabbits were first described by Phoenician sailors about 1000 BCE. The sailors were amazed by the tiny animal's extensive burrowing ability, and they brought tales about them back to their home ports. They called the land where they had discovered rabbits *I-Saphan-Im*, which translated into High Latin as *Hispania*, and later became the Spanish word *España*.

Thus, the very name of Spain is linked to rabbits. Spanish coins in Roman times even featured rabbits on them. Romans then seem to have spread rabbits extensively throughout their Empire, mostly as a game animal.[2]

The first writings mentioning rabbits as something other than wild animals are found in the work of the Roman historian Marcus Terentius Varro (116–27 BCE). Varro advocated putting rabbits in walled *leporaria* (rabbit gardens) to facilitate hunting. These weren't gardens

as we commonly think of them, but large parks ranging up to a hundred acres or so.[3]

And while these *leporaria* are the origin of the warren system of rabbit keeping, the rabbit was still not a truly domesticated animal, although they most likely had become tamed (desensitized to human presence). A figurine from the third century CE found in France depicts a child holding a young rabbit; we can presume, from evidence like this, that interactions between humans and rabbits were becoming more common.[4]

In southern France, archaeologists have discovered *cadaver wells* (what seem to be the ancient equivalents of trash pits) near clusters of homes. The skeletal remains of rabbits are present in these pits in high enough concentration to indicate that rabbit was a readily available and presumably common menu item.[5]

Romans adopted the ancient Spanish custom of eating *laurices* (fetal or newborn rabbits) helping to spread that custom throughout the empire so widely that laurices eventually became a well-known food during the Lenten period in France.[6]

Eventually, keeping rabbit warrens in France became the sole right of the nobility. Professional warreners were employed to manage the animals, both in the warren itself and to prevent the animals from escaping and damaging neighboring fields and crops.[7]

Monasteries in Western Europe began keeping rabbits during the medieval period, and records from that time exist of rabbit trading between the monks and nobles.[8]

By the 13th century, the only mentions of rabbits were of those kept in warrens as we think of them, and where intentional selection for specific traits takes place. It would not be much of a stretch to picture monks noting different colors or patterns that might pop up from time to time, pulling those animals from the warren and bringing them into a more tightly managed breeding system to concentrate those differences.[9]

Very little writing exists on any of those efforts or management details, but by the 16th century, several color varieties of rabbit are

described in written records. The Champagne d'Argent, one of the oldest breeds of rabbit in the world, was developed by monks in the Champagne region of France. The name literally means "Silver from Champagne."[10]

By the 18th and 19th century, rabbit keeping was no longer the sole privilege of the nobility, and more writings on rabbit husbandry begin to emerge. Rabbit hutches sprang up all over Western Europe, both in rural settings and in towns. Rabbits were kept as a ready source of meat which could be accessed as needed. These animals were fed on forage picked daily, as well as crops such as grains, roots, and hay.[11]

Interestingly, there seems to have been a reduced amount of rabbits produced after that change, possibly due to the change in, or inconsistency of, diet provided.

In the late 1890s, Belgian Hares (which are really a rabbit, not a hare—see Chapter 3) were imported to the United States, and the rabbit craze was on. Rabbits sold for unheard-of prices at the time, and families such as Guggenheim and Rockefeller were well-known figures in the American rabbit world.

By the early 20th century, a veritable explosion of breeds and varieties occurred. Creating new breeds and strains became a serious practice for fanciers at the time, and several of the breeds we know today (such as the American Blue and White, the American Chinchilla, and the Silver Fox) were created.[12]

Rabbits became big business. In fact, Edward Stahl, the founder of the American Chinchilla breed, still bears the distinction of being the only person to make a million dollars with rabbits, during the Great Depression. An ad in

FIGURE 1.1. This ad is one of several in that particular issue. We always find old magazines like this fascinating for the look they offer at management and techniques of days gone by.

a *Hares and Rabbits* magazine of the time advertised *one* furrier looking to purchase five million rabbit pelts.[13] Imagine if there was a market for that many pelts, how many rabbits existed at the time!

In 1928, the first research station in the United States dedicated specifically to rabbits was built in Fontana, California, and produced a lot of the information about rabbit husbandry we rely on today. Unfortunately, this research facility was closed in 1964 due to a lack of funding.[14]

The work of the research station led to new methods of rabbit raising, most specifically the all cage broiler system (which all but eliminated the problem of *coccidia*) and the use of pelleted feeds (which eliminated a lot of the labor of raising rabbits and ensured that each rabbit got a balanced diet). Several breeds were also created and selected for production traits.

Changes in the food system after World War II favored more intensive, large-scale meat production with animals such as cattle and pigs, and rabbit fell out of favor. Fortunately, people are rediscovering how useful rabbits are on the homestead, which is what may have brought you to this book.

Rabbits can be raised in a variety of environments, can adapt to nearly any management scheme, and can provide a plethora of useful products. Small and quiet, they require much less in the way of fencing and space, but give back well beyond what they require from us.

Modern rabbit keeping differs greatly from the ancient *leporaria*, but rabbit still remains a unique and very useful livestock.

CHAPTER 2

What's Your Plan?

This is a question Eric asks me regularly when I hatch another idea, or seem to be jumping into any scheme too quickly or without a lot of forethought. It's a joke around our house, but "what's your plan?" is a valid question, and one that should be asked and re-asked, on a regular basis.

What is your ultimate goal when beginning your rabbit venture? Is it *self-sufficiency*? No other species of livestock will produce quality protein with less space than the rabbit, and rabbits will add additional benefit to your garden by producing the best fertilizer available. Is it a niche at the *farmers' market*? Rabbit, for some folks, can take a little getting used to, but once market shoppers have tried it, they will be loyal customers for life. Is it marketing to *restaurants*? A new generation of bold and creative chefs have made rabbit a hot menu item across the US. Are you interested in *heritage breed conservation*? All heritage breeds need good, solid *breed stewards* willing to put their own egos aside and work to the benefit of the breed as a whole.

There is no right or wrong goal. But be honest with yourself about your skills, abilities, and resources—especially time.

It's easy to get caught up in the excitement of starting a rabbitry, but without a good solid goal it can be too easy to wind up with a mess. Don't be like one well-meaning family that purchased rabbits with the goal of supplying meat for the family…and found out, when it came time, they could not process the rabbits. Now these folks have a dozen, beautiful, well-cared-for pets.

The assumption of *Raising Rabbits for Meat* is that you are interested, on some level, on producing and processing meat rabbits. There

FIGURE 2.1. This USDA label provides quality assurance.

is no way from point A to point B without harvesting those animals. The best time to have the conversation about whether or not you are able to kill and process animals yourself is well before you make the first mating.

On the flip side, if your goal is to produce fryers for sale either to restaurants or farmers' markets, do some research into both federal and state regulations.[1] Whether or not you like it, the law is the law, and trying to circumvent legalities one way or another is a risky, potentially lose-it-all strategy. In the US, USDA inspected processing is required for sale to restaurants and for shipping across state lines, and state regulations can vary widely on how many rabbits can be sold at farmers' markets.

Self-Sufficiency

Raising rabbits for your own freezer is a highly fulfilling job. You can feel satisfaction like no other to be able to look in a freezer full of home processed meat and know that you are doing the best you can to take control over your food supply.

If you plan to involve your children in raising rabbits, have a good long conversation with them about your goals, plans, and what you expect their involvement to be. Many parents dread having an honest conversation with their kids about what the ultimate destination of those rabbits will be, but often that dread can lead to making too big deal out of it and creating the problem you fear solving.

After all, barely a generation ago, all our food came from either the farm or a local source, and kids helped feed, water, and care for animals every step of the way. We haven't evolved that far from these roots, we've just lost touch with them. I firmly believe that we aren't doing kids a favor by sugarcoating the realities of life and death, including

what it takes to eat meat for dinner. I also believe that kids are brighter and more resilient than we often give them credit for.

Processing at home is probably the largest hurdle for the novice. See if you can find someone experienced to walk you through it the first couple of times, and don't be shy about asking for help.

Farmers' Markets

If one of your rabbitry goals is to make a little money, farmers' markets may be a good option. Depending on rules and regulations where you live, government inspection may be required to sell retail, especially if you plan to sell over a certain quantity. Be sure to include costs such as processing, transportation to and from market, booth rental, and other miscellaneous costs in pricing your meat per pound. Also, factor your time into the cost as well. Often truly pricing out what it costs to produce that fryer can yield a price per pound that may shock consumers who are used to cheap commodity meat. Yes, today's consumers are much more educated, but there is still a way to go.

Another wise investment if you decide to sell rabbits for meat is product liability insurance. Anyone can be named in a lawsuit. No one likes paying for insurance. But in today's increasingly litigious society, insurance can be an inexpensive cost for peace of mind.

A piece of advice: Don't name every rabbit in every litter. Name the breeding stock if you must, but give yourself a little distance, at least initially.

Restaurants

Seeing a rabbit dish on a menu for $20–$30 per plate can give you dollar signs for eyeballs. Keep in mind that government-supervised processing of meat served to the public is required, which can add a lot to the costs of production. Restaurants also depend on being able to acquire a consistent volume of rabbit. If they plan to put you on the menu and one month you can provide 25, but the next month only 12, they will find another producer, and they may or may not come back to you.

Rabbit, just because of its size to cost ratio, is one of the more expensive proteins chefs will ever use. Their bottom line is also critical for both your success. So don't shortchange yourself to get your rabbit on

FIGURE 2.2. A rabbit dish at the Rieger Restaurant in Kansas City, Missouri.

their menu; a good product will speak for itself in the hands of a good chef.

Many chefs have also become accustomed to being able to pick up the phone and order what they need at a moment's notice. For some it can be a rude awakening to discover that you may or may not have a ready supply of fryers.

And likewise, chefs can change their menu without notifying you. If you've raised to a certain production level based on their order and they stop ordering, you have a surplus you now need to scramble to market.

A talented chef that understands production cycles, variability, open and honest communication, and is invested in your product is a valuable asset. Treat those chefs accordingly.

A wise, longtime breeder once told us that in order to be profitable marketing heritage meat products, you either have to stay so small your costs stay small as well so that you can control the whole process—or you must become so large that you drive the market. Restaurant sales are a middle ground that can eat into profit quite quickly, and you can find yourself being forced to be more reactive than proactive.

We wouldn't change a thing about our journey because it has led us to friendships within the food community that we truly value, but there's no doubt a different path would have been easier.

Heritage Breed Conservation

Our focus at Rare Hare Barn has been conservation of heritage breeds. The meat business came about as a result of the conservation mission, rather than the other way round.

The breeds we chose to focus on at one time constituted a large part of the millions of rabbits found in the US in the early 20th century. These rabbits were dual-purpose breeds, selected for both meat and

fur quality, and the animals are larger than many of the breeds in vogue more recently.

With the rise of industrial agriculture and the advent of subsidized meat production—and with an increasingly urban population—rabbit declined in popularity and availability as a homestead meat animal. As a fur animal, the focus turned to rabbits with white pelts which could easily be dyed, and white rabbits such as the New Zealand began to replace colorful fur breeds such as the Silver Fox or the American Blue.

Coupled with the explosion of pet breeds and the trend to consider rabbits more as pets than livestock, certain breeds began to decline precipitously in number. By the late 1990s, some breeds which had once numbered in the hundreds of thousands had been reduced to only a few hundred.

At one American Rabbit Breeders Association (ARBA) gathering in Wichita, Kansas, among the nearly 20,000 rabbits and cavies (guinea pigs) on exhibit, I struggled to find five American Blue and White rabbits, stuffed in a corner of the exhibition hall.

This may on the surface not seem like a big deal, but recognition on the ARBA list of breeds is determined by each breed's presence at a national show. Should a breed fail to exhibit in five consecutive shows, it will be dropped from the list of recognized breeds. Once dropped, an entirely new Certificate of Development must be issued, and it can take years, and multiple tries, to get the breed accepted again. This is such a laborious process that once a breed or variety has been dropped, it is likely to not be added back, and may roll down the cliff to extinction.

Finding only that handful of rabbits cemented our desire to work with scarce breeds, even though our focus was not showing. These breeds were outstanding production rabbits back in the day, and we felt that they could be again.

Heritage breeds are also more likely to require a little more outlay in cash to purchase, and some travel may be required to find them. Make sure the selling breeder is able to provide pedigrees for stock as well.

Registering a rabbit is also different from registering offspring from other species. To be registered, an ARBA certified registrar will inspect

the rabbit, to make sure both it and its ancestors reached the proper weight, and then if the rabbit passes, the registrar will place a tattoo in the rabbit's right ear.

This is not important for meat production, but should you decide to get in to rabbit showing, it may be something you wish to consider.

Breed Stewardship

The phrase *breed steward* gets tossed around quite a bit these days. Heritage breeds are often exciting to those who want to raise something different, unique, and challenging.

But unfortunately, that uniqueness can also become a breeder's downfall rather quickly. Heritage breeds, rabbit and otherwise, don't fit standard marketing schemes very well. This can be somewhat daunting to those who believe that "if you build it, they will come."

Our informal survey of people getting into heritage breeds (no matter what species) found that the average length of time some new breeders stick with the animals is about 18 months.[2] This gets them through one round of seasons, a couple of production cycles, and into the phase where the invariable challenges present themselves, and their management has the most impact on production.

Most of the time in these cases, I believe people have truly just not done their homework regarding what is involved in committing to the breed or species over a long term. And heritage breed stewardship is a commitment.

A true breed steward understands:

- That stewardship is a lifelong commitment.
- That the highs and lows level out over that lifetime.
- It's not a get-rich-quick scheme.
- It means making tough decisions and placing what benefits the breed as a whole over personal desires and goals.

True commitment to the breed and the breed standard is necessary. Don't try to change the breed or breed standard to suit you. There is a huge difference between selecting traits that suit your production

goals and trying to reinvent the breed altogether. Don't try to change the breed standard to suit the animals you are breeding; breed better animals true to the breed standard.

Should the breed or species not work out, put some time and effort into passing them along to another breeder rather than dumping them at a sale barn, especially in the case of a critically endangered breed.

Breed stewardship isn't for the fainthearted. But true stewards who are invested in the long-term success of the breed are crucial to its survival.

Helpful Pointers

As with all other species of livestock, management is the key to long-term success.

The best stock, the best equipment, and the best intentions won't make up for poor or inconsistent management. Rabbits may require less in the way of equipment and facilities than other livestock, but they require as much, if not more, skill and attention to detail.

While rabbits are easier for an individual (or for children) to take care of by themselves, good husbandry skills are essential. Rabbits can be low maintenance, but they are not no maintenance.

Observation is key. Good observation and consistent care and management will take your rabbit venture to the next level, and keep your rabbits healthy and productive.

CHAPTER 3

Rabbit Biology

Rabbits are members of the taxonomic order *Lagomorpha*, animals which have four incisor teeth in the upper jaw, and two in the lower. Up until the early 20th century, rabbits and hares were believed to be in the same order as rodents, but rodents only have two incisor teeth in the upper jaw, so the two groups were separated. Rabbits are also totally herbivorous, whereas rodents will eat meat.

Order *Lagomorpha* is further divided into the families *Leporidae* and *Ochotonidae*. *Leporidae* translates into "those that resemble hares" and is a large family, containing many genera and over 60 species.

The *Leporidae* family breaks down into genera and subgenera.

Three genera relevant to rabbit keeping are the genus *Lepus* (which includes hares and jackrabbits), the genus *Sylvilagus* (which includes cottontails and North American wild rabbits), and the genus *Oryctolagus*, which is the European wild rabbit (*Oryctolagus cuniculus*), the progenitor of all our modern breeds of domesticated rabbit.

No matter how much rabbits and hares resemble one another, they cannot interbreed. Domestic rabbits let loose will not run off to join their wild cottontail cousins and make happy little hybrid babies.

Each of the three genera have different numbers of chromosomes: Hares have 24 pairs, cottontails have 23 pairs and domestic rabbits have 22. No controlled lab studies have produced offspring from breeding rabbits and hares, and no matter how many anecdotal stories exist, none have been verifiable.[1]

Rabbit Taxonomy

- **Kingdom:** *Animalia* (not plant or mineral)
- **Phylum:** *Chordata* (has a spinal cord)
- **Class:** *Mammalia* (warmblooded, give birth to live young, have hair)
- **Order:** *Lagomorpha* (having four incisor teeth in the upper jaw)
- **Family:** *Leporidae* (nearly 60 species of rabbit and hare)

Characteristics

Rabbits and hares differ in a few important physiological ways. It doesn't help clarify things that there is a breed of rabbit called the Belgian Hare and a species of hare called the Jackrabbit. However, the young of rabbits and hares are very different at birth, and they tend to have different athletic abilities and thrive in different environments.

Rabbit young are *altricial*—meaning born hairless, with their eyes closed, and completely dependent on their mother's ability to make a warm and cozy nest.

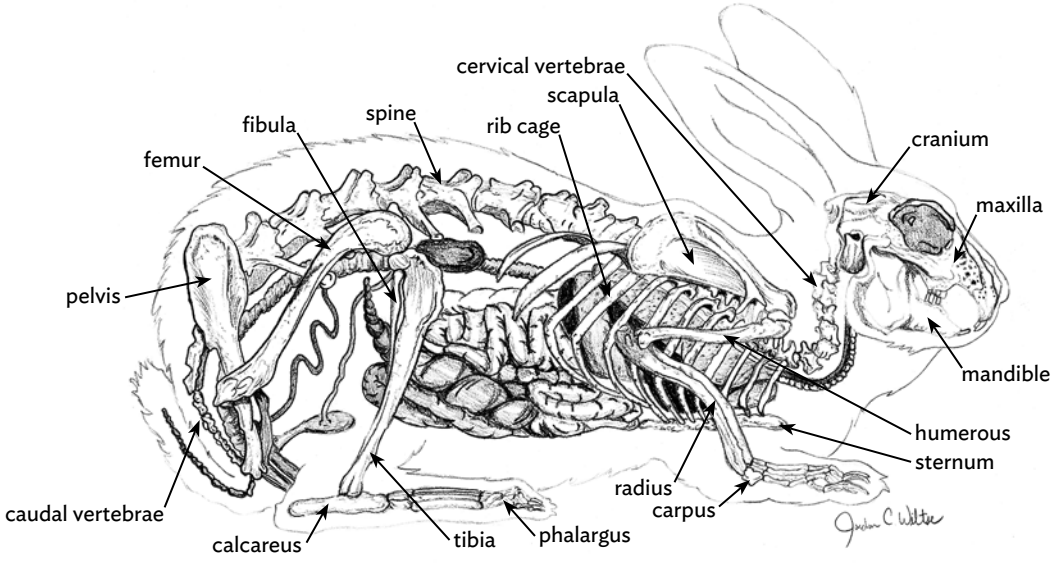

FIGURE 3.1. Rabbit skeleton. Credit: Jordan Wiltse.

Rabbits (*Oryctolagus* and *Sylvilagus*)
- born hairless
- born blind
- born helpless in a fur-lined nest
- live in brush and cover (wild)
- have shorter legs and are built for quick bursts of speed
- have relatively shorter ears

Hares (*Lepus*)
- born fully haired
- born with eyes open
- can run within a few minutes of birth
- born in a grassy depression in the ground
- have long legs and are built for endurance
- have very long ears

Hares on the other hand are *precocial*—born fully haired, with eyes open, and are able to get around soon after birth.

Hares are built for not only speed but endurance, and thrive in areas with sparse plant life. Rabbits bank on quick bursts of speed and the ability to outmaneuver predators, and tend to be found in areas with more dense vegetation.

For the most part, hares and rabbits look a great deal alike so it's easy to mistake hares for rabbits and vice versa. They both generally have *agouti coloration*, which is a pattern of banding on each individual hair shaft that gives them the familiar brown, peppered look.

Distribution

Rabbits and hares are found on nearly every continent. They traveled to most areas of the world, either by natural migration or by being intentionally released on islands and in other areas to serve as a future source of meat. On many islands, in the absence of any natural predators, rabbits thrived at the expense of the local flora and fauna, devastating natural ecosystems.

Australia is a poignant example. A handful of rabbits were released in the late 1850s for hunting purposes. Those few rabbits multiplied rapidly, and a decade later, millions were present, representing one of the fastest population explosions of any mammal in history.

Species versus Breed

All of our breeds and varieties of domestic rabbit descended from the European wild rabbit, *Oryctolagus cuniculus*, which also started out as a plain agouti-colored animal, and through careful (and sometimes accidental) selection, took on the variety of colors we see today. Breed is a further subclassification of species.

As noted earlier, different species of Lagomorphs cannot interbreed, but the different breeds of domestic rabbit *can* because they are the same species.

These rabbits have had a devastating effect on Australia's ecology, eating native plants that kept topsoil from eroding; they have likely inadvertently caused the extinction of numbers of native animals as well. Control efforts, which have included poison, trapping, hunting, and the introduction of the Myxoma virus, have all met with limited success.[2]

Fortunately in North America, the abundance of native predators helped keep rabbit populations in check.

Rabbit Physiology

If you have ever picked up and held a rabbit, you have more than likely felt its rapid heart rate.

A rabbit at rest can have a heart rate of 130 beats per minute, but an active rabbit, or one that is stressed, can have a rate of up to 325 beats per minute. Their body temperature ranges from 99.1 to 102.9°F (37.3 to 39.4°C), and respiration ranges from 30 to 60 breaths per minute. Rabbits also as a rule breathe through their noses, and to find a rabbit breathing through its mouth is generally a very bad sign.

As you might expect from an animal with a metabolism that fast, rabbits are not a long-lived animal. Pet rabbits can live five to eight years, some even longer. Most production rabbits will remain in the herd for three or four years, after which they will generally be culled because their production has dropped. It sounds harsh, but because an important goal of a business is to turn a profit, feeding unproductive animals makes poor economic sense. We have on occasion had production rabbits well outlast their contemporaries. One particular doe was productive for six years, and we currently have a buck that recently turned seven. Both of these rabbits passed their productivity on to their offspring, and have earned their pensions. But individuals such as this are the exception, rather than the rule.

Rabbits also have one of the fastest turnarounds (meaning how fast they can go from birth to harvest) of any domestic animal. With a relatively short gestation and incredibly fast-growing offspring, a rabbit can become meat on the table in 12 weeks or less compared to a year or more for other species.[3]

Rabbit Physiology

- **Lifespan:** (average) 5–6 years
- **Temp:** 99.1–102.9°F (37.3 to 39.4°C)
- **Pulse:** 130–325 beats per minute
- **Respiration:** 30–60 breaths per minute
- **Estrous:** continuous/seasonal
- **Gestation:** 30–33 days
- **Wean:** 4–6 weeks

Rabbits possess one of the lightest skeletal systems of any mammal, averaging around 7–8 percent of their total body weight (compared to 15 percent in a cat of comparable size). This, combined with the incredibly powerful muscles in the hindquarters, is the main reason a rabbit can injure itself, even breaking its own back, if not handled properly. A misplaced kick, or a twist when being picked up, is enough to do the trick. This is why it's so important to learn to properly handle rabbits and be able to confidently and securely pick them up and carry them. It's pretty devastating to have a promising animal be ruined when injury could have been prevented. The occasional freak accident can happen, though: once Eric placed a doe in a buck's cage for mating. She stood up on the wall of the pen, just as the buck was attempting to mount, and the force of his body combined with the odd angle of hers was enough to break her back. However, this freak accident has only happened once in thousands and thousands of matings. Don't be afraid of handling your rabbits, just be aware of the vulnerability of that back. Handle them firmly and take steps to minimize any kicking and thrashing.

As with most prey species, a rabbit's eyes are spaced far apart on its head, giving it a wide field of vision but leading to a blind spot under its nose. The rabbit has a very dexterous, very sensitive split lip, and it depends on that and its whiskers to find its food.

The ears are perhaps the rabbits most distinctive feature, and because they are so highly vascularized, critical in heat regulation. Rabbits do not sweat, and must depend on passive thermoregulation to cool themselves. Rabbits pant to exchange body heat with the atmosphere,

and blood vessels in their ears expand, so their ears function much like radiators to exchange body heat with cooler air. This is also why good ventilation in summer is critical for rabbit health, but more on that in Chapter 6.

Rabbit fertility (how easily they become pregnant) and fecundity (how easily they carry the pregnancy and deliver, and how often) are legendary. Consider that it is possible for a doe to give birth to a litter of 6–12 kits between six and eight times a year. As you might imagine, larger litters will take a toll on a doe's resources, and the larger the litter, the less frequently she will be able to produce them.

Rabbits have two separate uterine horns, each with its own cervix. It's possible for a doe to have kits in one horn and not the other, but much more commonly they will have kits in each horn, and one horn will give birth and then the other.

And one other thing that makes rabbits distinctive in the mammalian kingdom is the behavior of *cophrophagy* (the practice of consuming one's own feces). It sounds disgusting to humans, but as we will see in Chapter 8, it makes perfect biological sense to the rabbit.[4]

So there's a quick overview of some of the things that set rabbits apart (and probably more than you wanted to know about taxonomy) from other livestock and can make them a challenge to manage. But with good husbandry, and a little awareness of those factors making domestic rabbits unique, you will be well on your way to running a successful rabbitry.