Brief facts

- Rabbits are native to Europe, but because of human actions and adaptability today they exist in the wild on every continent except Asia and Antarctica. In many countries rabbits are considered invasive pests. However, in such countries as Australia and New Zealand they are considered a scourge and are blamed for extinction of many native species: they eat native herbs, damage crops and facilitate flourishing of many not-native predators such as foxes and feral cats.

- Rabbits were domesticated about 1,500 years ago. They were kept for their meat and fur. In their behavior domesticated rabbits do not differ significantly from their wild counterparts. Most differences are observed in temperament - majority
of domesticated rabbits are more docile than wild rabbits.

- Rabbits were introduced to Britain by Normans soon after the Conquest of 1066. Rabbits were housed in every conceivable manner - in pits, cellars, boxes, barrels, outbuildings, and in rabbit courts. Escaped colored rabbits interbred with the common grey and their offspring were called parkers. At the end of 19th century abundance of wild rabbits made their trapping and ferreting more profitable than maintaining a rabbit warren.

- The Angora rabbits were in existence prior to 1723. Other breeds started to shape up only at the beginning of 19th century. By the late 19th century more than 10 breeds were established including the Lop, Dutch, and Patagonian (now extinct). The Californian, an American breed, was established in 1923. The breed combines the size of the New Zealand White, the quality of fur of the Chinchilla, and the fine bone structure of the Himalayan. Commercial rabbit breeders specializing on production of meat and fur primarily breed New Zealand Whites and Californians. Today there are about 76 recognized breeds of domesticated rabbits that vary tremendously in size, fur type, coloration, and general appearance.

- The rabbit is a test species commonly use in in vivo hazard identification tests to determine the developmental toxicity potential of pharmaceuticals, pesticides, and many other chemicals. Rabbit serves as a model organism in developmental biology, surgery, and in studies of many congenital, acquired (cancer and others), and infectious diseases (syphilis).

**Habits of rabbits**

If you are keeping a rabbit you might observe the following normal behaviors (not exhaustive list):

- **Air-boxing** - fast forward flicking of forelimbs while rabbit sits upright on its haunches.

- **Body rolling** - rabbit throws itself onto ground in a sideway roll, may lie immobile on one side in outstretched position for several seconds after the roll.

- **Chin marking** - rabbit rubs the chin over an object releasing secretion from the chin gland.

- **Coprophagy** - rabbit eats mucus-covered coprophagy pellets (cecotropes) directly from anus the chin gland.

- **Digging** - prolonged paw-scraping usually associated with burrow excavating.

- **Foot thumping** - loud thumping of the ground with the hind feet, usually when alarmed.

- **Grooming** - usually preceded by air-boxing, starts with licking of forelimbs which then are passed over the head and ears, continues with full body grooming.
Grooming takes up to 16% of rabbit's activities.

- **Locomotory**
  - hopping
  - jumping
  - play gamboling
  - running
  - playing with a toy

Rabbits crave social interaction. This is why a rabbit housed with a companion spends as much as 70% of its time resting while touching another rabbit or allogrooming. Mature unaltered rabbits, however, will most likely fight and breed. Rabbits housed singly without interactions with conspecifics or humans may perform **stereotyped behaviors** defined as "unusual motor acts which are repeated regularly and almost invariably, and which serve no apparent function". Stereotyped behaviors are considered a sign of boredom, anxiety, or frustration. Rabbits may exhibit the following stereotyped behaviors:

- Rhythmic biting of water bottles and pulling out stoppers.
- Biting, chewing or licking of bars, walls, and the grid floor.
- Excessive fur pulling.
- Rapid aimless circling sometimes accompanied with kicking the walls.
- Head swaying and vertical sliding of nose between bars.
- Pushing and shoving of objects with the head.

Bored neglected rabbits exhibit prolonged periods of inactivity lying down, sometimes in a hunched position with the head lowered in a corner.

**Rabbit personality**

In one study rabbit owners were asked to describe their pet using any adjectives they find suitable. Based on the descriptive words provided by owners, authors were able to classify all studied rabbits (more than 100) into six different groups:

- **Physically active** (lively, playful, escape artist, mad, etc.)
- **Antisocial** (grumpy, aloof, nervous, aggressive, etc.)
- **Enjoys human company** (friendly, loving, affectionate, etc.)
- **Mentally alert** (inquisitive, cheeky, intelligent, alert, etc.)
- **Self-assured** (confident, assertive, strong character, etc.)
- **Quiet and placid** (calm, sweet, gentle, nice, laid back, etc.)

**Keeping rabbits (husbandry)**

- **Grouping**
  Rabbits for group housing should be litter mates (ideally) or same age rabbits which have been kept together from weaning. Groups of mature females can be kept together; however, it is preferable for the animals to be siblings. Mature males tend to fight and may need to be kept individually. Castration reduces aggression. Castration is usually carried out within 3-4 weeks after weaning. A maximum group size of between 6-8 mature animals is recommended.

- **Size of living quarters**
  The minimum area for a floor pen or a cage should be sufficient for rabbit to carry out its natural range of locomotory behaviors. Ideally, rabbit should have an opportunity to hop some steps or to jump up and down onto a ledge. An area of 3ft x 6ft (2 sq.m) could accommodate a maximum of 3 rabbits.

- **Ambient conditions**
  It is very important for rabbits to be surrounded with a familiar smell. Strong smelling bedding, such as sawdust or wood shaving, should be avoided. Strong smelling perfumes or cleaning agents should not be used in presence of rabbits. Rabbits are able to detect sounds inaudible to humans (ultrasound). Regular house equipment (refrigerator, air conditioner, etc.) might emit ultrasound and be stressful for rabbits. It is not recommended to keep them near such objects. Background masking noise from radio, when nobody home, can be beneficial for rabbits.

- **Bedding**
  Bedding should be non-toxic, adsorbent and comfortable. Straw is superior to majority of materials that can be used for bedding (shredded paper, sawdust, hay, bark, peat, coconut fiber, cat litter, etc.). There is some evidence that rabbits prefer straw or shredded paper and avoid shavings and sawdust.

- **Cleaning**
  Rabbits tend to urinate and defecate at preferred sites, which facilitate cleaning. Partial cleaning of a pen or cage, and a continual turnover of bedding is preferable to a total cleanout so that not to disturb rabbits too often. Complete cleanout, however, should be carried out every 2 weeks.
• Watering

A plentiful supply of clean water should be provided at all times for a pet rabbit. Automatic watering systems and water bottles are recommended. Care must be taken to prevent rabbits to play with them to avoid leakage. Wild rabbits derive most of their water requirements from fresh plant material.

• Feeding

Rabbits should be fed ad libidum, which may result in obesity if minimal requirements for physical activity level are not met. Rabbits have specific dietary requirements that include 13% to 18% dry matter dietary crude protein, 12% to 16% dietary crude fiber, vitamins A, E, and K, and 0.5% to 1% dry matter calcium. Fiber is especially important for the production of shot-chain fatty acids and gastrointestinal motility. Diets containing less than 10% crude fiber often results in enteritis. Dry pelleted food should be given at the rate of around 60-80g/kg body weight. The pellets should be supplemented with vegetables such as cabbage, carrots, turnips, dandelion leaves, apples, etc.

• Handling

Rabbits have very delicate bone structure - skeleton in rabbits represents only 7%-8% of the body weight (12%-13% in cats). Heavy muscles on the hindquarters and the delicate skeleton predispose rabbits to fractures of the back and hind limbs. A firm but reassuring attitude should be adopted while handling a rabbit. The animals are picked up by the scruff, supported under the hind legs and carried with the rabbit's head under the handler's arm. Support of the hindquarters is essential when transporting rabbits to avoid injury.

• Health

Severe disease problems are usually minimal in pet rabbits. The most common problems necessitating treatment are: injuries from fighting or mishandling, abscesses, pneumonia, snuffles, malocclusion, and sore hocks (lesions on the bottoms of the feet). Other possible illnesses include middle ear disease, conjunctivitis, enteritis, diarrhea (stress, infection, and wrong diet), dermatitis, coccidiosis, ear mites, ulceration of tongue and stomach, dental problems. Obesity may lead to a variety health problems in rabbits due to inability to perform many natural body maintenance behaviors (see references).

Some reproductive traits

• Rabbits are induced ovulators, which means that ovulation in female occurs after mating. Females are going through periods of receptivity (estrus) that last about 7-10 days, followed with a "quiet" period (interestrus) for 1-2 days.

• Female rabbits can be very aggressive toward males. Because of it, female taken to male for mating should be watched closely. If female is receptive, they will
mate twice within about 30 minutes, after which they should be separated.

- Female builds a nest by collecting mouthfuls of nesting material (usually dry, long grass), which she carries to an underground nesting site. She lines the nest with her own fur, which she plucks from her own body. She closes the nest by digging soil into the tunnel and then patting it down by alternate, downward thrusts of the forepaws. She then deposits a few drops of urine and a few fecal pellets on the top. The pattern can be sometimes observed in domesticated rabbits at the entrance of their cage/pen nest box.

### Developmental stages (life cycle)

A breeding doe in captivity can provide 40 young per year (5 litters of 8, or 4 litters of 10). Rabbits are more sexually active during long photoperiods (spring and summer). In the late fall - early winter productivity decreases even in domestic rabbits.

<table>
<thead>
<tr>
<th>Developmental stage</th>
<th>MeSH</th>
<th>Notes</th>
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<tbody>
<tr>
<td>oocyte</td>
<td></td>
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<tr>
<td>unfertilized ovum</td>
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<td></td>
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<tr>
<td>embryo</td>
<td></td>
<td><strong>average gestation period is about 30 days</strong></td>
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<tr>
<td>pre-implantation embryo</td>
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<tr>
<td>zygote</td>
<td></td>
<td><strong>fertilization occurs in about 12 h after mating</strong></td>
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<tr>
<td>cleavage</td>
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<td><strong>dividing egg</strong></td>
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<tr>
<td>morula</td>
<td></td>
<td><strong>55-72 h p.c. (post-conception)</strong></td>
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<tr>
<td>blastocyst</td>
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<td><strong>4-6.5 days p.c.</strong></td>
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</tbody>
</table>
post implantation
embryo

implantation begins on day 6-7 p.c.

gastrula MeSH
neurula

8.2-9.2 days p.c.

organogenesis MeSH
development of internal organs, nervous system, limbs, face modeling, etc.

fetus MeSH

by 19.5 day fetal appearance is complete, and organogenesis achieved

post natal

neonate

until 1-1.5 week of age; neonates are naked, blind and helpless (altricial); the mother visits the nest for only a few minutes each day to nurse them

juvenile

until sexual maturity (about 8 months); juveniles are weaned at about 4 weeks of age and become independent

adult

age of sexual maturity is attained at 3-5 months of age for males and females
depending on the breed; lifespan is up to 12 years in captivity

Photo gallery
Resting positions of rabbits

According to one study, pet rabbits spend about 12% of their time resting. Look at the above pictures to determine positions of rabbits.

- **Sitting at ease** - in upright stationary position, with rear end and forelegs on ground and ears down.
- **Sitting alert** - as above, but with ears erect.
- **Lying alert** - resting with trunk on ground, hindlimbs tucked under the forelimbs lying under or forward stretched from body.
- **Lying at ease** - body trunk on ground, all four limbs outstretched and belly exposed.

References

**Articles and links**

- Major topic "Rabbits": free full text articles in PubMed


- **Animal Diversity Web: *Oryctolagus cuniculus***

- **Domestic rabbit: comparative placentation**

- **Obese rabbits at risk by Dr. Jackie Schulman, DVM**

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nemose@live.com

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