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## Deformation of anterior limbs in rabbits

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**Little information is available about angular deformations of front limbs in rabbits. Causes seem to have an osseous or muscular origin, or are congenital, leading to laxity (mobility) of the periarticular structures and ossification retardation.**

Growth of bones is influenced by a number of factors: genetic, hormonal (hypothyroidism), metabolic, but also vascular or electric. Failure of one of these

factors can lead to abnormal growth and elongation of the long bones of the limbs. In growing animals, an asymmetrical mechanical pressure (body weight) on the



**Figure 1:** Side view of a New-Zealand female rabbit aged 14 weeks. The deformation of the front limbs appeared at the age of 10 weeks. (Picture courtesy: Cindy Perkins).



**Figure 2:** Vue frontale de la lapine Néo-Zélandaise âgée de 14 semaines. La déformation des membres antérieurs est apparue à l'âge de 10 semaines. (Picture courtesy: Cindy Perkins).

cartilaginous tissues of long bones can lead to joint deformation, with inward or outward deviation of the limb. A wrong diet of the doe at the end of gestation (mineral or vitamin deficiencies, intoxication) can also lead to limb deformation in her offspring.

Limb abnormalities observed in rabbits include:

- Acquired or congenital angular deformation at the level of the limb joint;
- Congenital deformation and bowing of the long bones of limbs;
- Laxity or hypermobility of ligaments.

In some rabbit breeds it appears that a hereditary origin related to a single autosomal recessive gene leads to bending of the upper limbs: Beveren rabbits, Belgian giants, French Silver, and Dutch rabbits. The

curvature of the limbs develops at the age of 2 or 3 weeks. The upper part of the limb bends inwards, while the paws are deviated laterally. The final irreversible stage of deformation is reached at the age of 2 to 3 months. Even if the cartilage problem corrects itself and heals naturally at the age of 2.5 months, the deformity is definitive with inward curvature of the ulna and radius (forearm bones, between the elbow and the front paw).

#### **Angular deformations of joints**

Angular joint deformities of the upper limbs are present before birth, or appear soon after and before the closure of the epiphyseal plate (cartilage growth plate). Lateral deviations of joints observed in rabbits include:

- Medial, in varus or in O limb, with a lateral inward deviation of the limb distal to, or below the point of deformity (Figures 1, 2).
- Lateral, valgus misalignment or X limb, with lateral (outward) deviation of the limb distal to, or below the point of deformity (Figure 3).

Osteoarticular deformities affect upper limbs more often than lower limbs in



**Figure 3:** Young Belgian hare presenting a valgus misalignment (in X) of both limbs at the ulnar joint (elbow) (Picture courtesy: Michel Gruaz).

rabbits. Exceptionally, an upper limb is affected by a double deformity at the ulnar (elbow) and carpal (foot) joints. It is usually present at birth or appears later during the growth phase of the young rabbit, around the age of 2 or 3 weeks. It has, furthermore, been observed that angular deformities may be accompanied by the rotation of the limb.

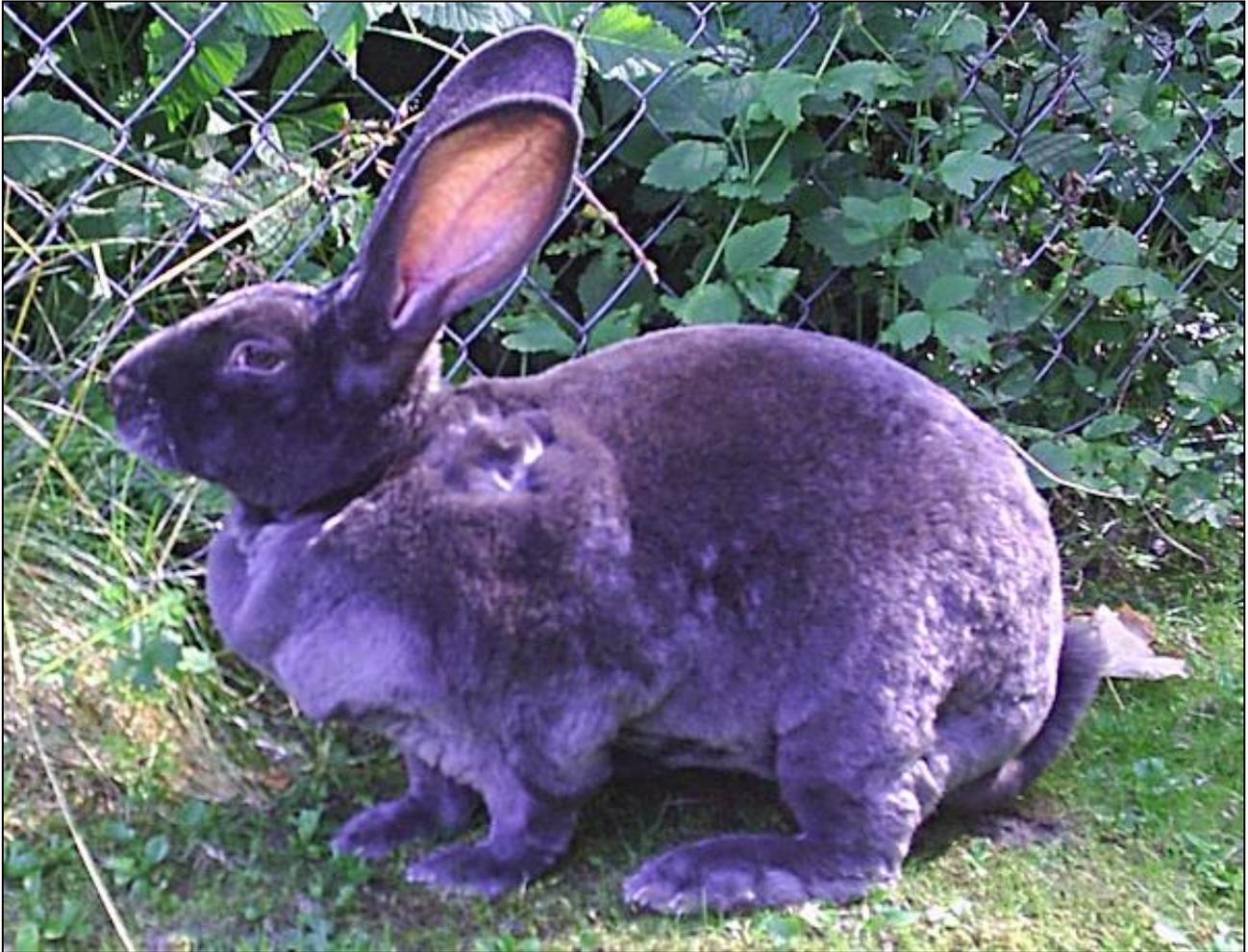
#### **Causes for limb deformation are varied**

Ligament laxity. It is usually present at the birth of a rabbit kit and is painless. It can also appear later in the life of a rabbit (Figure 4). Morphology of the affected limbs appears normal on X-rays. In foals, this type of deformity often disappears spontaneously. Rabbits suffering from this problem may develop juvenile arthritis accompanied by pain in the affected articulations.

In older animals, deformity of the limbs in the sagittal plane can be indicative of osteoarthritis. This syndrome is irreversible and painful, and the rabbit should be administered analgesics. Treatment with glucosamine and chondroitin has proven helpful.

Cuboid bones hypoplasia. The cuboid bone is one of the seven tarsal bones. It ossifies rapidly after birth. Thyroid dysfunction (hypothyroidism) is responsible for the lack of osseous development in foals, and hinders the normal ossification of bones. Spontaneous improvement has been observed when cartilage is still immature. After that period, the deformity is permanent. The deformed joint will ossify, degenerate and bone hypoplasia is irreversible. This deformity increases the risks of partial luxation or limb fracture.

Deformation of long bones. Growth irregularities between the medial and lateral parts of long bones lead to an angular deformation of the limb, usually in valgus or



**Figure 4 :** Side view of a Rex female rabbit with a sagittal deformation of the front limbs. One cause may be ligament hypermobility.

X shape. This deformity is usually present at the rabbit's birth, but it may also develop later, during the growing phase of the rabbit. In foals, positioning of the fetus in the uterus is suspected to lead to an abnormal compression of the growing cartilage during gestation. The caused trauma leads to unequal growth of long bones. This type of deformity is not associated with pain.

Preterm offspring and overweight. Joint deformation is also observed in animals that are born prematurely, before calcification of bones takes place. Weight of the newborn can lead to angular deformity of joints. A similar problem has been observed in single born rabbit kits (Figures 5, 6). They are

bigger when born, with a strong bone structure and grow rapidly as they are well-fed by the doe.

#### **Clinical signs**

A rabbit suffering from deformed X or O-limbs has a normal appetite and is in good health. The sole clinical signs are an abnormal or a difficult gait and possible development of arthritis.

#### **Clinical examination**

A rabbit that suffers from articular deformities should be examined from the front, from the side and from the back, at rest and during exercise on a non-slippery surface. Palpation of the limb helps evaluate



**Figure 5:** Front and lateral views of a 3 months old rabbit with lateral O-deformation of both front limbs and possible hypermobility of the ligaments. Heaviness is suspected in this case, as this rabbit weighed already 2.7 kilos (5.9 lb.) at this young age. (Picture courtesy: Stefan Röthlisberger).

the presence of physical deformities, of pain, swelling, etc. A radiographic evaluation of limb bones and joints enables to identify the cause, if primary (congenital) or secondary after an osteo-articular trauma. In order to detect lateral joint deformities, the animal should be perfectly positioned for the front view. In the case of sagittal deformation, front and side views are recommended.

### Treatment

If the problem is discovered at a young age, a splint or rigid bandaging of the affected limb(s) may help correct the deformation. Movement and exercise possibilities of the young rabbit should, however, not be hindered, in order to develop the muscles in the limbs.

There is no treatment for deformed limbs in rabbits. If only one limb is affected,

amputation may be helpful if it hinders proper movement and exercise or when it causes pain. If the curvature and deformation of the limbs is severe, euthanasia should be considered. Indeed, secondary complications of the skin may appear in region that supports the weight of the body. Ulceration of the skin (very painful) and pododermatitis are often observed.

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**Figure 6:** Young 24 day's old rabbit suffering from deformed X limbs (valgus) of both upper limbs (Picture courtesy: Michel Gruaz).

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