

## **Causes of mortality in newborn rabbits**

### Esther van Praag

# Even if the mortality rate is low nowadays, the discovery of dead newborn rabbits is always unpleasant, and is accompanied by a questioning of breeding practices.

The breeding of show rabbits is a delicate balance between the genetic make-up of a given breed, genetic and environmental factors, and the increased susceptibility of a particular breed to congenital or juvenile hereditary diseases or defects. Hygiene, diet and external factors, such as maternal behavior of the pregnant doe during



**Figure 1**: Harlequin doe during kinding. She does barely show any sign of suffering, and cares for her newborn kits calmly and quietly. Picture: Michel Gruaz

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gestation and after kindling, litter size, birth weight of the newborn or weather conditions also play an important role (Figure 1). All of these factors will affect the health of the doe and the survival rate of her newborns.

The postpartum mortality rate of newborns is not a definitive value. The average rate is generally low, less than 10%. It may nonetheless reach 50% or even 100% of a litter during the first two weeks of life of the newborn. The mortality rate of 4 to 8 weeks old rabbits remains high and then decreases to near zero in rabbits aged 3 months or older.

The most common causes of death are, in decreasing order: abandonment of the litter, unknown causes, cannibalism and mutilation of the newborn, insufficient milk production or lack of feeding the offspring, crushing in the nest, sickness or weak or malformed newborn (runts). Finally, the death of the doe may result in the death of her offspring.

#### Purebred vs mixed breed rabbits

Domestication and artificial selection of rabbits has resulted in the alteration of a variety of traits characteristic of the wild rabbit and in the development of breeds that have different sizes, body structure or fur coat. The set of genes carried by a rabbit, also called genotype, is affected, even if the understanding of these alterations remains poorly understood nowadays. These changes greatly influence the chances of survival of the newborn. The percentage of newborn mortality before weaning varies among rabbit breeds. Pure lineages with a high rate of endogamy have a significantly higher mortality rate of newborn before weaning than those resulting from crossing between two breeds.



**Figure 2**: In dwarf rabbits, 25% of the offspring are homozygous "true dwarves" carrying the lethal dwarf gene (arrow). They are smaller at birth and present deformities of the skull and limbs. Picture: Gilles Python



**Figure 3**: Six weeks old homozygous spotted rabbits. Their very white coat and incomplete nasal butterflies are typical of spotted rabbits affected by the congenital megacolon syndrome. Picture: Michel Gruaz

The fixation of the genetic traits of a rabbit breed can raise the incidence of undesirable or lethal characteristics. This is particularly the case in dwarf rabbits, where 25% of the offspring are homozygous "peanuts" carrying the lethal dwarf factor (Figure 2). They die within a few days after birth. In spotted rabbits, homozygous nearly white offspring (1/4 of the litter) – called "Charlies", suffer from the congenital megacolon syndrome and most die young or develop poorly into adulthood (Figure 3). Heterozygous spotted (1/2) and colored offspring (1/4) have a normal digestive system and survive.

Some breeds have a high rate of consanguinity. This is the case of the Belgian bearded rabbit breed. Many individuals of this breed die suddenly around the age of 1 year, or develop eye problems that render them blind (Figure 4). They also have an increased sensitivity to vestibular syndrome (torticollis or head tilted on the side). In other breeds, the hereditary defect of juvenile cataract is transmitted to the offspring. Young rabbits develop bilateral cataract at the age of 4 to 6 weeks.

Descendants of parents who belong to different breeds present the combined qualities of their parents and have a greater vigor compared to purebred newborns. Their survival rate is significantly higher after birth and till weaning, compared to purebred offspring.

#### Impact of diet on the offspring

The diet of the pregnant doe will also influence *postpartum* mortality. It must be



**Figure 4**: Evolution over 6 months – and not yet finished, of a hereditary eye defect in a female Belgian bearded rabbit aged 1.5 years old. Pictures: Esther van Praag

healthy, rich and remain uncontaminated by rodent feces (Figure 5). Drinking water must be clean too. The addition of probiotic products to the diet has a positive influence on newborns. Indeed, these innocuous bacteria stimulate the appetite of the doe. As a consequence, milk production is improved. These bacteria also protect the digestive system against pathogenic bacteria, reducing the risk of digestive diseases. Plants can also stimulate milk production. They include anise, clover, trigonella or cumin seeds. Finally, the administration of supplements containing methionine, choline, folic acid, iron and sulfate into the feed of the doe has been accompanied by a significant decrease in mortality of her newborn during the first weeks of their life.

#### Maternal character

The survival of kits before weaning is highly dependent on the doe (Figure 1, 7). Indeed, during the growing phase, young rabbits spend roughly 25% of their existence with their rabbit mother. Age, weight and health of the doe as well as time interval between two gestations plav important roles. The survival rate of newborn is lower in a too young doe, whose body growth is not finished, a primiparous (first gestation) doe or females older than 1.5 years. The latter have an increased tendency to lose embryos during gestation or to abandon their newborns after kindling.

The size of the litter is also a determining factor and will affect the performance of a young rabbit once adult. Thus, a litter with less than 8 individuals has a mortality rate of about 11% during the lactation period. This rate reaches 20% in a litter of 10 pups and increases to 30% when there are 12 kits or more. This phenomenon seems to be related to the position of the fetuses in the uterus before kindling and to the lower birth weight of individuals belonging to a large litter.

Finally, the number of functional teats varies from 8 to 10, more rarely 11 or 12 in female rabbits. The ventral teats are the most accessible, unlike those located between the upper limbs or thighs. When the litter is prolific, competition is tough during feeding. Weak individuals and "runts" do not drink enough milk.



**Figure 5**: The presence of voles (photo) or other rodents can contaminate rabbit food and lead to stress to females rabbit stress during kindling. Picture: Arie van Praag

#### Adoption by a nursing doe

Sharing of newborn between two nursing females that kindled at the same period of time will increase kit survival (Figure 6). Nursing does readily adopt kits from another doe during the first 48 hours after kindling.

It is also possible to reunite two medium-sized litters and present them alternately to two nursing females. In this case, it is important to bring together strong individuals of equal weight together in the new "family» or the weaker individuals only in order to give everyone the same opportunity of suckling and, thus, ensure their survival. The young receive more nutrients when fed twice a day and will grow faster. They have a higher fat/muscle tissue ratio than young rabbits fed once a day only

and will have a positive performance in adulthood. Such a method can also be arranged when the female rabbit does not produce enough milk and/or does not feed her offspring appropriately.



Figure 6: Reunited litter with young spotted rabbits and Thuringer rabbits. Picture: Michel Gruaz



**Figure 7**: Caring and patient doe nursing her offspring. Picture: Arie van Praag

#### **Other causes of death**

Environmental stress can be fatal to newborn rabbits. If the disturbance occurs during kindling, the doe may abandon her litter outside the warm nest or kill her offspring by cannibalism, in order to protect it from predators or rodents. Postpartum stress or nervousness can kill too, when the doe starts drumming on the floor with her hind feet and crushed the small rabbits.

Climatic conditions also play an important Reproduction is indeed strongly role. influenced by the duration of the day and the ambient temperature. Spring is the best season: longer days and warmer temperatures favor high rates of conception good milk production. This rate and decreases when the ambient temperature continues to increase, as in summer. The female rabbit evacuates heat by breathing

faster and via the blood circulation by dilatation of blood vessels. The stress caused by heat leads to a decrease in food intake. As a result, there is an increased risk of losing embryo during gestation, of gestation toxemia, when the carbohydrate or energy demand of the embryo exceeds maternal supply, and of reduced milk production. Indeed, milk production is optimal up to 20°C (68°F), and then it decreases significantly. At 30°C (86°F), milk production by rabbits is lower by 40% as compared to the milk production at 20°C (68°F). The chosen nursing model of the newborn rabbits also plays an important role. When the rabbit is primiparous, controlled feeding may help. This means that the doe sees her offspring during 30 minutes a day only, the time to feed milk properly. A model of free feeding is favored



**Figure 8**: Young rabbits that died from staphylococcosis. They have abscesses under the chin as well as skin infections and lesions. Picture: Hazel Forrest

with experienced and calm does, having correctly cared for their previous litters.

#### **Diseases**

There is a genetic variation in the susceptibility to intestinal or respiratory diseases (pneumonia) among purebred or crossbred newborns before weaning. An acute form of staphylococcal disease has been observed in rational or group rearing. The disease is caused by the bacterium Staphylococcus aureus. Healthy carriers can harbor the pathogen in the skin or mucous membranes and transmit it by contact to their congeners and/or their offspring. It can also be transmitted indirectly, via the hand of man, work tools, hay or straw, etc. Female rabbits suffer from mastitis, abscesses or pododermatitis. The rate of mortality within a litter is abnormally high. Newborn rabbits aged 0 to 15 days are particularly sensitive and develop abscesses or skin lesions (Figure 8).

Another bacterium that is fatal for newborns is *Pasteurella multocida*. This pathogen causes various respiratory problems, but also abscesses in the teats, neck, throat, paws, back and uterus. Young rabbits are also very susceptible to parasitic diseases such as coccidiosis and die 3-4 days after onset of the first clinical signs, e.g., anorexia and diarrhea, accompanied by a reluctance to move. This parasite stimulates the proliferation of the pathogen bacterium *Escherichia coli*, major cause of acute fatal watery diarrhea.

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