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Genetic features and anomalies of the Hereford breed of cattle

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Introduction

The Hereford is a breed of beef cattle. It is one of the most widespread breeds in the world. They are known for their longevity (females can procreate for 15 years while males are good procreators for 12 years), rapid population growth, undemanding maintenance and a high-level adaptation to different climatic conditions. That's why this breed is crucial for the development of livestock in Ukraine. Moreover, the genetic peculiarities of animals make a good basis for further researchers of breeders and geneticists.

Research materials and methods

This work is based on the articles about the genetic peculiarities of Hereford cattle posted in Online Mendelian Inheritance in Animals (OMIA) and the National Center for Biotechnology Information (PubMed).

Research results

Colour, type of wool, polled, the presence of horns and results of crossbreeding are the crucial peculiarities of Herefords. The typical colour of this breed is reddish-brown with white areas along the abdomen, limbs, head and tail end. Also, there is sometimes a white line along the back. The inheritance type of this feature is autosomal dominant, the gene of the reddish-brown type of wool (*COPA* (*DR⁺DR*)) is located on the third chromosome. It is worth mentioning that the breeders worked for a long time on making a white head colour typical only for Hereford cattle. Nonetheless, Soviet geneticists bred a new breed with the participation of Hereford - Kazakh Whiteheaded, which can be considered one of the types of Hereford cattle.

There are individuals with curly and soft wool among the representatives of this breed. This feature is inherited as autosomal dominant, the gene of curly wool (*KRT27*) is located on the 19th chromosome. Hereford breed is characterized by its polled or the presence of horns. The polled types are more common, because of the dominance of the polled gene (*POLL*). The classical breed type is horned (horns are directed downwards or forwards).

Animals of this breed should be crossed only within their breed for the maintenance of its purity and its common characteristics (especially meat traits). Hereford cattle has proven itself on the good side in the modern livestock industry. Therefore other breeds derived from this cattle appeared. One of them is black Hereford. It was obtained by crossing Hereford, Goldstein and Aberdeen-Angus breeds. If the animal carries 50% of Hereford blood and 50% of Aberdeen-Angus blood, it is called Black Baldy (this breed's black skin reduces the risk of burns on the udder).

The most common genetic disorders of this cattle breed are hypotrichosis, eye cancer and idiopathic epilepsy. Hypotrichosis is a condition in which there is little or no hair. Calves are often born with very short hair that can fall out leaving bare spots or areas particularly sensitive to friction. It may change with age, disappear completely or become less noticeable. On the place of the lesion short "silver" wool starts to grow. Hypotrichosis in Hereford's genealogy is inherited as an autosomal recessive trait. Genetic tests are carried out to detect the presence of markers. The results are reported in this way: HYF/HYPF — free of the mutation causing Hypotrichosis. HYC/HYPC — carrier of the mutation causing Hypotrichosis. HYA/HYPA — affected by the mutation causing Hypotrichosis.

Herefords can get eye cancer mostly in areas where animals are exposed to more sunlight. The disease starts with conjunctivitis. Cancer usually affects animals older than 4 years. Herefords which do not have black circles around the eyes are more vulnerable to this disease. It is revealed that by the type of inheritance this type of disease is multifactorial. Studies showed that the disease prevalence of an offspring whose parents did not have cancer is 11%, the offspring of sick parents - 36%, and when one parent was sick — 22–25%.

The third, genetically determined disorder, common for Herefords is idiopathic epilepsy. The main symptom of which is that the animal lies on its side with outstretched limbs. The time of the first attack can vary from the time of birth to several months. It can be affected by various factors such as a rapid change in temperature or increased physical activity. Idiopathic epilepsy is prevailing for the horned type of Herefords. The disease is inherited as an autosomal recessive trait. The results are reported in this way: IEF — free of the mutation causing Idiopathic Epilepsy, IEC — carrier of the mutation causing Idiopathic Epilepsy, IEA — affected by the mutation causing Idiopathic Epilepsy.

Conclusions

In conclusion, Hereford cattle is one of the most profitable animals to keep. It is defined by its high endurance, longevity, the ability to reproduce every year, unpretentiousness in food and high productivity. This breed has some genetic peculiarities that do not affect its life and the quality of production. Over the years, three major genetic "defects" inherent in this breed were identified. However, these problems can be prevented or even avoided by undergoing genetic tests.