

The Icelandic arctic fox

The arctic fox is a small predatory mammal, native to the arctic regions of the northern hemisphere. It is the only terrestrial mammal native to Iceland, where it lives both in coastal and inland regions. The fox is believed to have settled here at the end of the ice age, although the oldest remains found are only 3500 years old. Research shows remarkably little difference between animals between regions, and this is likely caused by the fact that the fox travels a lot, and has been shown to be able to travel around 800km on sea ice and up to 2000km on land. (Baldursson, 2014) The coastal foxes feed mainly on sea birds and their eggs, bugs and sea mammal corpses. The inland foxes have a slightly more luxurious diet of ptarmigans, eggs, mice and reindeer and livestock corpses. (Hornok et al, 2020) The foxes are generally born around mid-May after a gestation period of just over 50 days. (Hersteinsson et al, 2009) Average litter size is around 5,4 in Iceland. (Baldursson, 2014)

They come in two colors. The white arctic fox is almost all white during the winter but gray-brown on the back and sides and light gray on the belly in the summer. The brown fox is dark brown all year round. The brown fox is more common in Iceland, especially in the western part. The white fox is more common in the highlands and in the east. The population of arctic foxes in Iceland declined between 1950 and 1970, but then grew steadily from 1978-2003. In fact, the population increased six-fold during that time period, from around 1300 individuals to around 8000. (Baldursson, 2014)

The main mortality factor for the Icelandic arctic fox is considered to be human hunting. The fox has been hunted since Iceland was settled around the year 900, and since around 1950 the government has financially supported fox hunting due to the menace it brings to sheep farming and the Eider population. In 1994 the Icelandic arctic fox population became protected by the law, and permanent damage to the population by hunting or other methods was banned. Fox hunting is still allowed and supported, however, and since the year 2000 around 7000 foxes have been hunted. In 2005, the cost of fox hunting to the government was estimated at around 61 million ISK. In the 1990's the damage to farmers caused by foxes was estimated at just below 25 million at the króna's current value. (Baldursson, 2014) Many Icelandic farmers bear an inspired hate towards the fox, and have for a long time. The nation as a whole also generally seems to have a rather complicated view towards them. (Jónsdóttir, 1986) However, in recent years it has been discussed that perhaps this persecution of the fox is not justified. Farmers have always proclaimed the fox a huge threat to sheep farming, but this is now deemed a questionable fact. In the time period 1979-2002, sheep remains were found in 19% of fox burrows. In half of these burrows remains of only one lamb were found. This likely points to the foxes dragging already dead lambs to the burrow. (Baldursson, 2014)

The fox is known to be too small to attack a full grown sheep and is even considered to be able to handle only small and sick lambs. However, the fox also ravages Common eider populations and causes considerable damage there.

When the climate in Iceland started to warm around 1980 the species numbers started increasing and is in direct correlation to the growing numbers of several bird species, specifically fulmar, pink footed goose and European golden plover.

Availability of food sources for the fox is fairly consistent year to year, but many of those sources are seasonal so the fox needs to be organized in order to survive the winter months. In spring following the mating season the fox is considered quite skinny after having had nothing to eat. Over the course of the summer there is abundance of food and the fox stays up 14-16 hours per day eating. When autumn arrives the number of mice has increased and becomes the main course on its

menu. In that time the fox buries carcasses of seabirds and other remains it may have found along with eggs to stack up its food supply in winter.

When birds leave and mice are scarce the fox turns to berries such as crowberries as its main source of fat production.

The 'melrakki' is extremely well adapted to cold temperature and the secret to its success lies of course in its coat. Under the thick outer layer of its fur lies a thin but lofty undercoat made out of fine hair that ensures isolation from severe sub zero temperatures. What makes this undercoat so special is the hair count, and on a single patch the size of a square centimeter there can be up to 25.000 hairs.

This security that the coat provides keeps the foxes metabolism stable down to -35°C.

When temperatures drop further down he can double the rate of his metabolism to produce warmth and only start to shiver when the rating reaches -70°C.

The arctic fox in Iceland has a unique process when it comes to growing their numbers.

Here the female will give birth to pups once every year, in the spring around May, and pregnancy lasts about 60 days. In Scandinavia, East-Greenland, Alaska and the tundra of Canada the arctic fox will give birth once every 3-5 years. These intervals are in uniformity with population numbers of various rodents that play a big role in their food chain. Nonetheless they can give birth to as many as 15 pups in a single litter.

The main rule of the fox is monogamy and solitude. It is not a communal animal and will never travel in packs like wolves. A couple will stay together for as long as either of them lives. They assist each other in the upbringing of their pups and work as a team to defend their home.

The purple bones mystery.

This study investigated a subset of 4338 fox mandibles collected between 2000 and 2019. The subset included a total of 4284 white mandibles and 54 purple.

In 2007, the first Icelandic Arctic fox with purple mandibles was discovered. The discoloration reappeared in 2013 and each subsequent year until and including 2018. This thesis is the first investigation of purple mandibles in Icelandic Arctic foxes. Hunter or latter mandible handling and storage were not related to the discoloration. Foxes with purple bones derive most of their diet from the ocean. Most purple bones originated from the Westfjords of Iceland; predominantly in the Súðavíkurhreppur municipality. The definitive cause was not investigated. Nevertheless, three potential causes of discoloration are postulated and discussed: (1) environmental pollutants, (2) alga pigments from the Drangajökull glacier that enter the food chain, and (3) sea mussel shell pigments. Further, this thesis suggests mussels would be the vector for transmission to foxes. As filter-feeders mussels accumulate pollutants and/or natural pigments from the environment and they are a secondary food source of Arctic foxes. The Arctic fox is a top predator, which means bioaccumulation of pollutants will be exacerbated and effects manifested earlier in this species. The abrupt occurrence, disappearance, reoccurrence, and location of purple mandibles suggests possible recent sporadic environmental events of variable duration occurring in the Westfjords.

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