

# **Case Study of an Electrocution Accident Caused by an Electric Fence for Farming**

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## **INTRODUCTION**

Wild animals pose problems to Japanese farmers, as they often enter farmlands and eat agricultural products. The damage caused by wild animals was recently estimated to cost farmers around 20 billion yen per year<sup>1</sup>. Electric fences are a popular countermeasure against wild animals. Indeed, electric fences surrounding plots of farmlands are a common sight in rural Japan.

While electric fences are effective for protecting farmlands from wild animals, they also introduce the risk of electric shock hazards to humans and farm animals. On July 19, 2015, two people were accidentally electrocuted by a leakage of electricity from an electric fence for farming. The Japanese media reported this accident extensively. By describing the details of this accident, this paper aims to discuss the lessons that can be learned from the said incident.

### **Regulations for the usage of electric fences for farming**

First, it is useful to quickly review the regulations for using electric fences for farming. Electric fences for farming are treated as a type of 'Electric Facilities for General Use' in the Electricity Business Act (EBA), which is enforced by the Ministry of Economy, Trade and Industry (METI). The EBA imposes the following four conditions on farmers who wish to use electric fences.

- A: In order to control electric shocks to a harmless level, a special device should be installed whereby the current runs for only 3 ms/s. (mega samples per second).
- B: An earth leakage breaker is necessary if the current of an electric fence is greater than 30 volts.
- C: A switch should be installed for cutting off the supply of electricity.
- D: A notice board alerting people of the danger of electric shocks should be placed near the electric fence.

Until 2005, only licensed electricians were allowed to build electric fences. This meant that farmers needed to obtain the license themselves or hire a licensed electrician to build an electric fence. However, this regulation was removed in 2006. Accordingly, manufacturers of farming equipment started aggressively marketing electric fences. Generally, these manufactured electric fences satisfy Conditions A–C. Thus, if farmers use manufactured electric fences and place notice boards nearby, all of the EBA conditions will be satisfied. However, farmers often buy electronic parts separately, and assemble the parts themselves to make an electric fence. While there are no official statistics on electric fences for farming, it is recognized that such fences became more widespread after the deregulation of 2006.

### **A case study of accidental electrocution**

On July 19, 2015, the first Sunday of the summer vacation for many Japanese schools, two families were enjoying a day out by a creek in Nishi-izu Town, an agricultural area of Shizuoka Prefecture. One person accidentally touched a wire on an electric fence close to the creek. The wire then snapped and hung down to the surface of the water. As a result, seven people received an electric shock: two were killed, two were severely injured, and the

remaining three were slightly injured. This accident was widely reported by Japanese media, and is referred to as the Nishi-izu Accidental Electrocution (NAE).

In Nishi-izu Town, wild deers have caused extensive damage to farmlands and crops. To prevent wild deers from entering their land, many farmers use electric fences. Mr. A, who set the electric fence in this case, is one such farmer. However, unlike other farmers in Nishi-izu Town, Mr. A constructed an unusually powerful electric fence by himself. Mr. A took power directly from a commercial power source (100-volt current) and amplified the voltage using a boosting transformer. The fence was not fitted with the special device required by the EBA to restrict the current to 3 ms/s. In addition, Mr. A did not fit an earth leakage breaker or power switch, and had not placed any notice boards close to the fence. Thus, Mr. A had ignored all of EBA conditions A–D.

Immediately after this accidental electrocution, Mr. A was questioned by the media and did not clarify that he had violated the EBA regulations. Instead, Mr. A explained that he usually only sent an electric current to his fence at night, and that he had forgotten to turn off the electricity on the morning of July 19, 2015.

His explanation was repeatedly reported by the media. This resulted in the popular belief that farmers should turn off the electric current to their fences during the daytime. Based on this misunderstanding, non-farmers started demanding that farmers turn off their electric fences in the daytime, regardless of whether the electric fences had been properly installed. Currently, agricultural groups and the Ministry of Agriculture, Forestry and Fisheries (MAFF) are attempting to inform non-farmers that electric fences for farming are harmless as long as they observe the EBA regulations.

Mr. A committed suicide on August 7, 2015. The media reported that Mr. A blamed himself for the accidental electrocution, and hinted at committing suicide in front of his relatives immediately prior to taking his life. On December 1, 2015, criminal papers were filed against Mr. A on suspicion of negligence resulting in death.

### **A special survey on the usage of electronic fences**

The NAE incident awakened considerable anxiety about the use of electric fences for farming. Thus, immediately after NAE, the MAFF sampled 99,696 points and conducted a special survey on the usage of electric fences for farming. The results are presented in Table 1. As can be seen, the EBA regulations are not always observed. Ironically, the EBA regulations are more often violated on farmlands used for public research purposes.

Most of the violations concern a ‘lack of notice boards,’ which is not directly related to the danger of causing harm to members of the public. Although there are relatively few ‘deficiencies in equipment attached to the power source,’ we should regard these cases as serious problems, because such violations introduce significant dangers to members of the public, as was the case in the NAE incident. Indeed, in most of the 22 cases in Table 1, farmers take power directly from a commercial power source (100-volt current) without the special device required by the EBA<sup>2</sup>, as did Mr. A.

## **CONCLUSION**

Previously, wild animals inhabited forestry and rarely wandered onto farmlands. However, the population of wild animals continues to increase, while the food available in forestry areas is decreasing. As a result, more and more wild animals enter onto farmlands looking for food. The MAFF estimates that damage to farmlands from wild animals has more than doubled over the past ten years<sup>3</sup>.

In this situation, it is reasonable for farmers to use electric fences. However, electric fences are not the ultimate solution. Farmers are finding that electric fences are increasingly ineffective, because wild animals become inured to electric shocks. As a result, farmers are tempted to use more powerful electric fences than are allowed by the EBA. The NAE

incident shows that the violation of EBA regulations can be extremely dangerous to the public.

Currently, there are numerous electric fences across Japan. It is difficult for the METI and the MAFF to comprehensively survey whether farmers are observing the EBA regulations in their use of electric fences. This is a major unsolved problem in the Japanese agricultural sector.

### Footnotes

- 1) The Ministry of Agriculture, Forestry and Fisheries (MAFF) estimates that, in the 2012 fiscal year (the Japanese fiscal year runs from April 1 to March 31 the next year), damage from wild animals and wild birds cost 18.8 billion yen and 4.2 billion yen, respectively. Details of these estimates are available at [http://www.maff.go.jp/j/seisan/tyozyu/higai/pdf/h2708\\_tenken\\_kettka.pdf](http://www.maff.go.jp/j/seisan/tyozyu/higai/pdf/h2708_tenken_kettka.pdf).
- 2) This information was revealed by Katsumi Akai's interview with officials in the MAFF. Further details (in Japanese) are available at Katsumi Akai, 'Denki Saku-no Tdashii Tsukai-kata (How to use electric fences properly)', *Aigamo Tsushin* 68, 2015.
- 3) According to MAFF estimates, the total volume of agricultural products damaged by wild animals was 0.3 million tons in the 2004 fiscal year and increased to 0.7 million tons in the 2011 fiscal year.

Table 1. Results of a sample survey on the usage of electric fences for farming

	Total number of sample points	Total number of points where violations of the EBA <sup>b</sup> regulations were found	Type of violation <sup>a</sup>			
			Deficiencies in equipment attached to the power source	Deficiencies in earth leakage breakers	Deficiencies in switches	Lack of notice boards
Farmlands used for public research purposes	146	22	0	5	1	16
Farmlands used for ordinary farming purposes	99,550	7,068	22	601	48	6,697

Notes: a. Because two or more types of violation can be found in the same sample point, the simple aggregate does not give the same total number of points where EBA violations were found  
 b. Electricity Business Act

Source: Ministry of Agriculture, Forestry and Fisheries.

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