

HF AND UHF RFID TAG DESIGN FOR PIG TAGGING

K. S. Leong, M. L. Ng and P. H. Cole

Auto-ID Laboratory, The University of Adelaide, North Terrace, SA 5005.

The identification of pigs is mandated by Livestock Disease Control Act 1994 Australia to prevent disease spreading and to maintain consumer confidence in the quality of Australian pork. Radio Frequency Identification (RFID) offers automated identification. Current RFID technology used in animal identification, such as cattle and sheep, is the Low Frequency (LF) system, which based on ISO 11785, but does not offer anti-collision capability. Tagging small piglets may mean that more than one animal may be in the RF field at the same time and anti-collision is recommended. This paper presents the use of HF (13.56MHz) and UHF (920 – 926MHz) RFID tags, for pig tagging in Australia. The RFID tags designed and presented in this paper are passive, reusable, to be attached on the pig's ear, and offer anti-collision capability.

An RFID pig tag must be protected from the harsh environment (tamper and water proof). The HF and UHF RFID tag antenna designs presented here are based on (Leong, 2007), but with modification to fit in the encapsulation casing (from Leader Products Pty Ltd, Australia) as shown in Figure 1. Texas Instrument HF Tag-it chips and UHF C1G2 straps are attached onto the newly designed antennas in the making of the HF and UHF RFID tags. 30 HF and UHF RFID tags are fabricated each for laboratory testing and the average read range in free space and on human hands (to mimic the actual deployment on a pig's ears) are as shown in Table 1. From experience, the performance of HF tag is limited by the size of reader antenna while the UHF tag is affected when attached to human hand. The field-testing is planned to record the frequency of a pig approaching a feeder to obtain food. Pig feeder shown in Figure 1 is to be used in the trial. The white boxes in the same figure shows the position of the reader antennas. Only pigs with their head lowered into the feeder will be recorded. The data recorded includes date, time, antenna ID, and the unique ID of the tag attached on the pigs' ear. The two reader antennas are facing each other, with a distance of 0.6m away from each other. The average read range when placed on hand for both the HF and UHF tags are above 0.3m (Table 1). Hence, the two reader antennas can provide a full coverage in the feeder zone. In conclusion, prototypes of HF and UHF RFID tags have been fabricated. Laboratory testing shows promising results. A large scale field-testing will be carried out in a commercial piggery in Victoria in August 2007.

Table 1: Average read range for the designed HF and UHF RFID tags

Read Range	HF RFID Tag (m)	UHF RFID Tag (m)
Free Space	0.34	0.80
Placed on Hand	0.32	0.40

Figure 1: (left) HF tag, UHF tag before encapsulation; (right) Pig feeder used, with the reader antennas positioned in the white box location facing each other.



Reference

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