



# Low Frequency (LF) vs Ultra High Frequency (UHF) How do they compare for livestock?

	Low Frequency	Ultra High Frequency
Conforms to ISO 11784 - Communication Protocol	Yes	No
Conforms to ISO 11785 - Data Format	Yes	No/but possible
Used for animal identification	Yes	Limited
Ear tag for cattle?	Yes	Yes
Bolus for cattle?	Yes	No
Implant/microchip for fish or equine?	Yes	No
Read range under ideal conditions	4 feet	15-24 feet (passive tag)
Easy to program/copy identifier	More difficult	Easy (unless encrypted)
Frequency spectrum	134.2 kHz	868-915 MHz
Multiple tags in field (anti-collision)	Yes (ISO 14223)	Yes (ISO 18000-63)
Speed of tag reading	Slow 20/sec	Very Fast 500/sec
COST: Transponder Chip Antenna	Medium/Low Medium Medium	Medium/Low Lowest Lowest
Cost of reader equipment	Low	Medium
Cost of conversion to ear tag	Low	Medium
Complexity (reader/antenna set up)	Low	High
Ear tag size (for best performance)	Small	Large
Standards for livestock identification	Yes	No (under development 2-3 years)
Numbering scheme for livestock	Yes (ISO 11785)	No (possible 2-3 years)
Inconsequential reads	Very Low	High
Environment, tissue	No absorption	Strong absorption
Capable to read in wide alley (i.e. not single file)	5 feet maximum	20 feet
Long term field trials (3-5 years)	Yes	No
Reading challenges in high metal environment (i.e. modern processing plant)	Moderate	Very High

For more information:  
info@canadaid.ca





# How do they compare for livestock?

## Low Frequency

ADVANTAGES	DISADVANTAGES
Best performance because of the high maximum regulator field strength level (1.3m, button tag)	Does not penetrate or transmit around metals i.e. iron or steel
Freedom to design different tag antenna form factors (compared to UHF) gives best performance with small tag designs	Slow read speeds, can only read – 20 tags per second (2k bit/second)
Penetrate materials well e.g. water, tissue, wood	Relatively large reader antennae
Excellent non-line-of-sight communications	Inlay construction - Is thicker than 900 MHz inlay - Inlay may be more expensive i.e. application dependent - Requires wire antenna, typically >100 turns
Very well-defined read zone	
No limitation using ferrite antenna for improved performance	
Simple, low cost readers	

## Ultra High Frequency

ADVANTAGES	DISADVANTAGES
High Data Rate: can read up to 500 tags per second (dependant on regional regulations)	Does not penetrate or transmit around metals. The performance is badly affected by tissue, water absorption; not suitable for implants or bolus.
Thinner tag construction i.e. foil antenna	Sensitive to nearly any material around, reflections may disturb the application
Lower manufacture cost for inlay only (secondary packaging of inlay required for livestock applications)	Different performance worldwide due to local regulations
Large Read range with line of sight communication (up to 8 metres)	Complex readers and antennas and set up required for gate applications
Flexibility to handle a wide range of read applications and read ranges	For animal applications, a more ridged construction is needed compared to usual plastic foil inlays to withstand the tough environmental conditions. This will increase the cost of the final tag.
	For same performance compared to LF, larger tag size is required (<1m, button tag)

\*Advantages & Disadvantages adopted from 'Technology Selection RFID LF/HF/UHF' document:  
[https://www.icar.org/wp-content/uploads/2015/08/Technology\\_Selection\\_RFID.pdf](https://www.icar.org/wp-content/uploads/2015/08/Technology_Selection_RFID.pdf)

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Purchasers of passive UHF RFID tags and readers should ensure the manufacturer of the passive UHF RFID tags and readers have the appropriate licensing agreements in place with the patent holders to permit the end user to use the technology.

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[info@canadaid.ca](mailto:info@canadaid.ca)

