

Michigan RFID Education Task Force



Selection Considerations for RFID-based Individual Beef Cattle Management Systems ¹

Before investing in the components of a radio frequency identification (RFID)-based individual animal management system, you need to consider several questions. This bulletin outlines general criteria that may be part of purchasing decisions about the four basic components of an RFID individual management system: tag (transponder), reader (transceiver), computer/scale indicator (data accumulator) and management software. This bulletin does not attempt to compare components directly, because they rapidly change.

Figure 1 shows the components of a basic system. For more information on these basic components and how they work, see bulletin E-2970.

Key overall considerations:

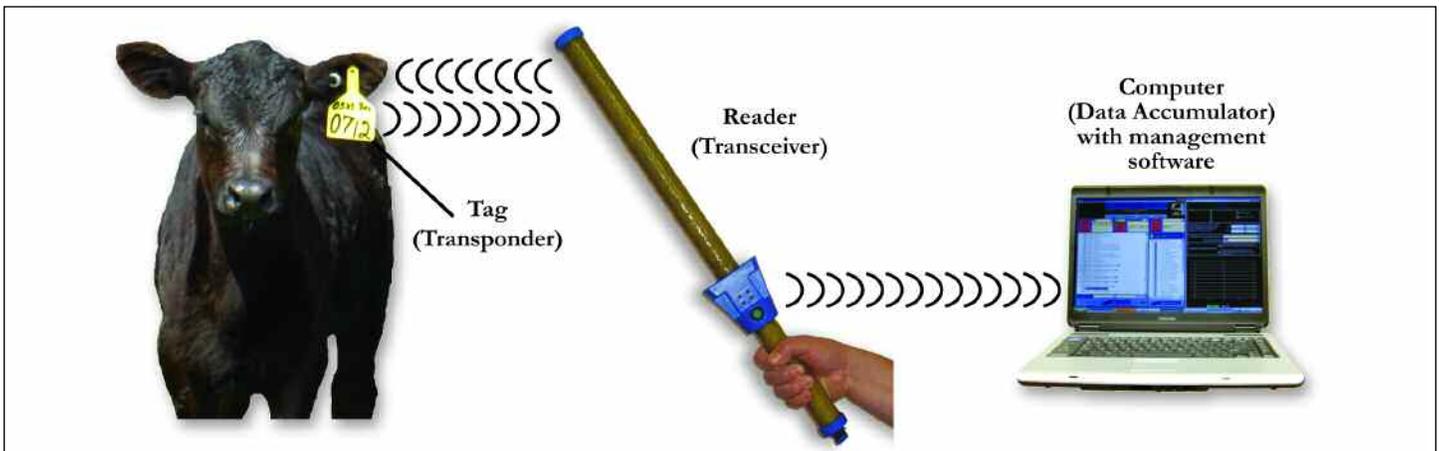
- Cost relative to expected benefits
- Comfort level with technology
- Component compatibility and ISO compliance

The most important consideration in selecting a system is the value of implementing its use. This value is best measured by the cost:benefit ratio. Producers should carefully analyze the costs versus the resulting benefits of RFID individual animal management. The number of animals over which to spread the fixed costs of a system is a primary factor in determining relative costs. Evaluating investment in an RFID animal management system is discussed in more detail later in this publication.

Systems vary in their level of flexibility and also in their complexity. Installation and maintenance of a complex system will require either your own expertise and(or) valuable technical support from the companies involved. The amount of user reference materials, on-call technical support and troubleshooting assistance may be a key consideration in any of these system purchase decisions.

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Figure 1. The four basic components of an RFID individual management system.



¹ Mention of trade names or commercial products in this bulletin is solely for the purpose of providing example information and does not imply recommendation or endorsement by Michigan State University or approval to the exclusion of other products.

Because it may be necessary to purchase components from multiple suppliers, it is important to verify that components are compatible with one another. The use of technology for RFID of animals is governed by two international standards — ISO 11784 and ISO 11785. ISO 11784 defines the code structure of the ID data, which is embedded in the memory of the transponder's microchip. ISO 11785 defines the technical specifications of how the transceiver gathers data from the transponder. Most commercial RFID products, including those that are accepted as official USDA devices, adhere to these two ISO standards. Remember that equipment that is ISO-compliant may still be unable to work together because of other considerations (e.g. wireless communication protocols). Careful consideration should be used when selecting system components that are not ISO-compliant.

Tags

Key considerations:

- Read range
- Cost

ISO-compliant tags are available as either half-duplex (HDX; permitting communication between tag and reader in one direction only at a time) or full-duplex (FDX; permitting simultaneous communication between tag and reader). Both types function sufficiently to allow individual animal identification under typical conditions. Half-duplex tags may offer greater read range but also may be more costly. Representative ISO-compliant tag manufacturers are listed in Table 1.

Readers

Key considerations:

- Application
 - * Stationary
 - Size and number required
 - * Hand-held
 - Connectivity
 - Size
 - User feedback
 - Memory capabilities
- Cost

The ISO 11785 standard allows communication to be either half-duplex or full-duplex and is designed to facilitate both methods to be incorporated in a single reader. Choice of a reader will depend primarily on what application it will be used for. Readers are available in two general configurations — stationary and hand-held. Although low-frequency RFID systems have relatively small read ranges, generally, the larger the antenna within the reader, the larger the read range.

As the name implies, stationary readers are mounted in place and are best suited to high-volume processing situations. The antenna for stationary readers can be configured as a panel on the side of a chute or alleyway, on a headgate or as a portal that surrounds a single-file walkway. Depending on the application, multiple panels may be necessary to achieve acceptable radio signal coverage.

Hand-held readers offer more mobility than stationary readers but may limit the speed at which cattle can be moved through a processing facility. Additional labor also may be necessary to operate the reader. Hand-held readers come in both corded and wireless configurations. Wireless readers may be able to transmit information to a data accumulator wirelessly. Others have internal memory capacity to store RFID numbers for later download to a data processor. Hand-held readers come in a variety of lengths. The type of animal restraint will help determine which length is necessary for the application. Most hand-held readers have feedback for the operator indicating when an ID has been read, such as lights, sounds and vibration. Hand-held readers often require batteries; therefore, considerations may include expected battery life and ease of recharging.

Example RFID reader manufacturers and the options they offer are shown in Table 2.

Computer/Scale Indicator

Key considerations:

- Cost
- Portability
- Durability
- Connectivity
- Quantity and type of information processed/stored

Table 1. Representative RFID tag manufacturers and communication technology.

Company name	Web address	Phone	FDX ¹	HDX ²	MDA approved ³
Allflex	www.allflexusa.com	800-989-TAGS	•	•	•
YTex	www.y-tex.com	888-600-YTEX	•		
Destron Fearing	www.destronfearing.com	800-328-0118	•		•
Reyflex	www.reyflex.com	613-342-8455	•		
Farnam Companies	www.farnam.com	800-234-2269	•		
Temple Tag, Ltd.	www.templetag.com	800-433-3112	•		
Global Animal Management	www.mygamonline.com	800-235-9824	•		

¹Full-duplex communication. ²Half-duplex communication. ³Manufacturers of official RFID tags approved by the Michigan Department of Agriculture.

Table 2. Representative RFID reader retailers/manufacturers and typical option offerings.

Company name	Web address	Phone	Hand-held options					Stationary options	
			¹ Corded	² RF	³ Bluetooth	⁴ Internal memory	⁵ PDA	⁶ Panel	⁷ Portal
AgInfoLink USA	www.aginfolink.com	303-682-9898		•	•				
Agrident	www.agrident.com					•	•	•	•
Aleis International	www.aleis.com		•				•		•
Allflex USA	www.allflexusa.com	800-989-TAGS	•		•	•			•
Boontech Pty	www.boontech.com		•		•	•			•
Destron Fearing	www.destronfearing.com	800-328-0118			•	•			•
EZ-ID	www.ezidavid.com	877-330-3943	•			•			•
Farnam Companies	www.farnam.com	800-234-2269		•	•				•
GrowSafe Systems	www.growsafe.com	403-912-1879		•					•
I.D.-ology	www.id-ology.com	800-395-5585			•	•			•
Northern Apex RFID	www.northernapex-rfid.com	260-637-2739				•	•		
SFK Technology	www.sfktech.com				•	•			•
Syscan International	www.syscan.com	514-631-7144	•		•	•			
Temple Tag	www.templetag.com	800-433-3112	•			•			•
Y-TEX	www.y-tex.com	888-600-YTEX		•	•				•

¹Reader can/must be directly connected to power source, computer or other data accumulator.

²Reader can communicate with data accumulator via radio frequency (RF).

³Reader can communicate with data accumulator via Bluetooth wireless technology.

⁴Reader has capability to store multiple RFID numbers and/or other individual animal information.

⁵Reader available in the form of a PDA.

⁶Reader with antenna in a panel configuration (animals must be single file).

⁷Reader with antenna that surrounds/covers walkway (animals must be single file).

Computers or data accumulators come in many forms. Desktop computers, laptop computers, personal digital assistants (PDAs) and scale indicators (scale heads) can all be utilized as data accumulators. For cattle-working environments, the durability of laptops and PDAs is an important consideration. PDAs are limited in their data processing and memory capabilities but may be a cost-effective option for data capture. Another important feature in a computer may be connectivity (i.e., wireless, Bluetooth, USB or serial data ports). Most new computers have more than enough processor speed, memory, hard drive size, etc., for individual animal management software applications.

Because weights are often central to individual animal management, most manufacturers of digital scales offer a scale indicator(s) that can interface with an RFID reader and function as a data accumulator (i.e., store IDs and weights). Even if a scale indicator cannot store RFID, many can be used to automatically transfer scale data to a computer. Example scale manufacturers that have indicators compatible with RFID readers are shown in Table 3.

Animal Management Software

Key software considerations:

- **Cost**
- **Features**
- **Reports**
- **Maintenance**
- **Technical support**

A good animal management software package can be extremely useful in helping producers utilize RFID to its fullest. Software programs designed for multiple unique applications are available. Individual programs come with a variety of features that may be applicable to a particular operation. Some features to consider are:

General:

- Program interface
[Does it look and act like other familiar programs?]
- Web-based data entry [Is program online?]
- Centralized data storage [Can data be stored off-site?]
- Data sharing [Can data be shared easily between parties?]
- Data protection
[If power is lost during data capture, are data lost?]
- Data backup [How easy is it to make copies of data?]
- User-defined inputs
[Can you customize what data are collected?]
- User-defined grouping
[Can animals be grouped on the basis of your operation?]
- Ration/feed tracking [Can feed records be included?]
- Medical/vet record tracking
[Can health records be maintained and retrieved?]
- Accounting options
[Can financial records be incorporated?]
- Search function
[Can you search for an animal or specific data?]

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Table 3. Representative RFID-compatible scale manufacturers.

Company name	Web address	Phone	Data storage ¹
Avery Weigh-Tronix	www.agscales.com	507-238-8238	•
Cardinal Scale	www.cardinalscale.com	800-441-4237	•
Digi-Star	www.digi-star.com	800-225-7695	•
Gallagher Power Fence	www.gallagherusa.com	800-531-5908	•
GrowSafe Systems	www.growsafe.com	403-912-1879	•
Livestock Supplies	www.kaniwi.com	403-546-0100	•
Reliable Scale Corp.	www.reliablescale.com	800-419-1189	•
Tru Test	www.tru-test.com	800-874-8494	•

¹Manufacturer offers scale indicator(s) with memory capabilities for storing data.

Animal Management Software, cont.

- Multiple herd/premise/site options
[Can data be logically organized?]
- Post-entry data alteration [How are errors dealt with?]
- User manual availability
[Is there a user manual for the software?]
- Hardware requirements
[Does the program require a specific data accumulator?]
- Report generation
[Are the reports useful, and can they be customized?]
- Benchmarking [Does program allow comparison of data?]

Feeder:

- Tracing cattle within yard [Can pens be easily changed?]
- Packer interface [Can complete or partial data be shared with a packer?]
- Customer access to cattle on feed records
[Can clients view data?]

One of the most valuable features of individual cattle management software is the ability to generate reports. Most programs come with a standard set of reporting options. More flexible programs allow generation of user-customized reports. Technical support and maintenance are also important considerations. From installation to operation of the program, technical support can greatly ease frustrations. Most programs require periodic maintenance; this usually comes in the form of an update or upgrade. In many cases, but not always, updates are free. Examples of individual animal management software programs that are RFID-compatible are listed in Table 4.

Cost

One of the key considerations in selecting every component of an RFID individual animal management system is cost. Anticipated costs and projected benefits of a system should be figured on a per animal basis. It is apparent that producers with very few animals cannot easily justify an expensive system on the basis of economics. Systems vary widely in price, however, and simple systems can be relatively inexpensive. Example low-, medium-, and high-cost systems are outlined in Table 5. Figure 2 demonstrates the reduction in cost per animal of these three systems as the number of animals increases.

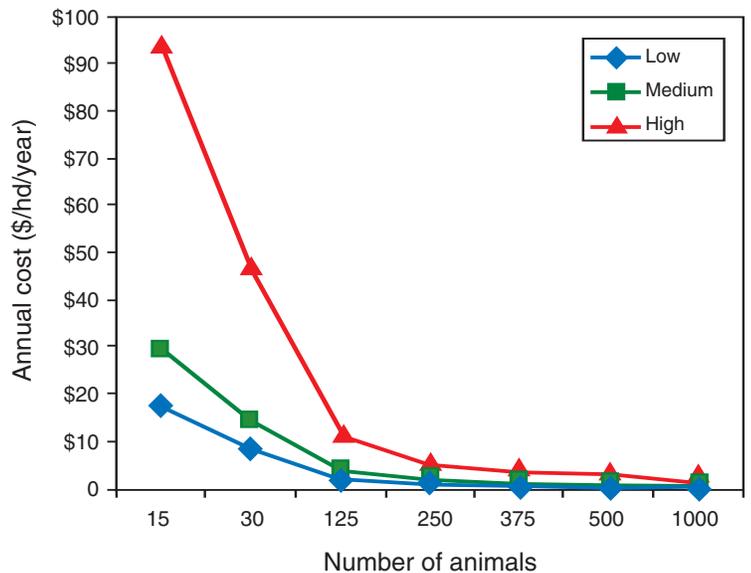


Figure 2. Annual costs for example RFID-based individual animal management systems (defined in Table 5) as affected by number of animals managed. Reader and data accumulator values depreciated over 4 years; software depreciated over 5 years. Graph was generated using a spreadsheet developed by K.C. Dhuyvetter and D. Blasi and is available at <http://www.beefstockerusa.org/rfid/index.htm>.

Table 4. Representative RFID-compatible individual animal management software.

Company name	Web address	Phone	Software name	Application	Herd management software		
					PC-based software	Web-based software	Data service provider ¹
American Angus Association	www.angus.org	816-383-5100	Beef Record Service	cow/calf	•	•	•
AgInfoLink USA	www.aginfolink.com	303-682-9898	Beeflink	all	•	•	•
Agritec Software	www.agritecsoft.com	563-374-1300	Vaquitec	cow/calf	•	•	•
Animal Profiling	www.animalprofiling.com	503-819-8873	WriteTag	all	•	•	•
Animal-ID	www.animal-id.com	501-907-5253	Animal-ID Producer/Stocker	all	•	•	•
Beef Concepts	www.beefconcepts.com	800-504-8482	Bovitrak	all	•	•	•
Cattle Soft	www.CattleMax.com	877-454-COWS	CattleMax	cow/calf	•	•	•
Champion Livestock Management Solutions	www.crlms.com	800-903-2036	Ranch Hand	cow/calf	•	•	•
University of Nebraska GPVEC	www.cowcalf.com	402-762-4357	Cow Calf 5	cow/calf	•	•	•
eMerge	www.emergeinteractive.com	877-330-3943	CattleLog Pro	all	•	•	•
Farm Works	www.farmworks.com	800-225-2848	Farm Stock	cow/calf	•	•	•
Farnam Companies	www.farnam.com	800-234-2269	LTS	all	•	•	•
Feedlot Solutions	www.feedlotsolutions.com	888-300-2727	Feedlot Solutions Software	feedlot	•	•	•
First Step Software	www.firststepsoftware.com		Herd Management 2000	cow/calf	•	•	•
Global Animal Management	www.mygamonline.com	800-235-9824	Metrix Pro	all	•	•	•
GrowSafe Systems	www.growsafe.com	403-912-1879	Grow Safe Beef	all	•	•	•
Herd-Pro Software	www.herdpro.com	715-246-0823	StocKeeper '03	cow/calf	•	•	•
IMI	www.imiglobal.com	888-343-4796	WebIntegrator	all	•	•	•
Lextron Animal Health	www.lextronanimalhealth.com	210-661-7300	LAMP	feedlot	•	•	•
Meta Farms	www.metafarms.com	952-215-3220	i-Production	all	•	•	•
Micro Beef Technologies	www.microbeef.com	800-858-4330	Accu-Trac Chuteside	feedlot	•	•	•
Midwest MicroSystems	www.midwestmicro.com	402-323-6969	CowSense	cow/calf	•	•	•
Optibrand Ltd.	www.optibrand.com	866-516-1462	Optibrand	all	•	•	•
Red Wing Software	www.redwingsoftware.com	800-732-9464	Cow/Calf	cow/calf	•	•	•
Research Management Systems	www.rmsusa.com	970-226-4080	Cattle Data Network	all	•	•	•
ScoringAg	www.scoringag.com	877-684-0018	ScoringAg	all	•	•	•
Turn Key	www.turnkeynet.com	800-999-0049	Management Analysis System	feedlot	•	•	•
Unlimited Solutions	www.cattlexpert.com	630-889-2848	CattleXpert	feedlot	•	•	•
Walco Technologies/Genexus	www.walcoindl.com	806-662-8618	Feed Yard Management	feedlot	•	•	•

¹Provide either Web-based or off-site data storage options, as well as other possible data services.

Table 5. Example RFID individual animal management system costs.

	System cost		
	Low ¹	Medium ²	High ³
Reader	\$700	\$700	\$3,500
Data Accumulator	\$400	\$900	\$900
Software	\$70	\$500	\$1,000

¹Wireless hand-held reader, PDA with Pocket Excel, wedge software (allows RFID capture in Excel).

²Wireless hand-held reader, laptop, herd management software.

³Panel reader, laptop, feedlot individual animal management software.

References

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Miller, K. 2006. Buying ID software. BEEF Dec. 2006. Vol. 43, No. 4. p. 36-40.

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