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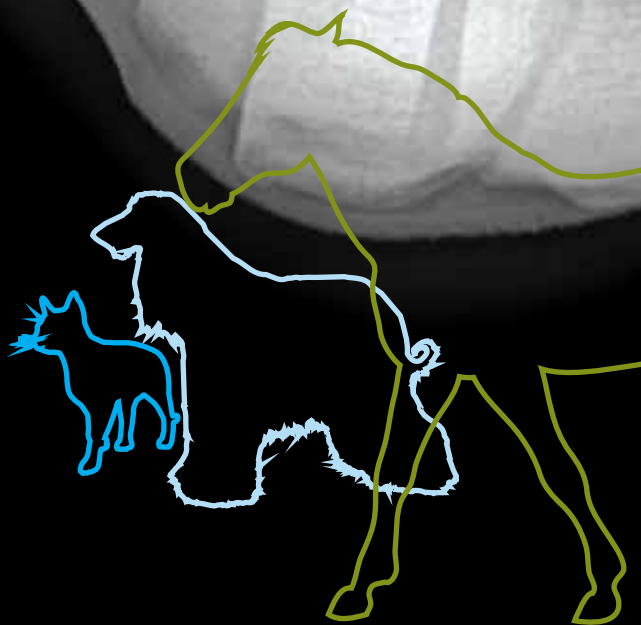
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Digital RADIOGRAPHY

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Digital radiography is a key technologic development in diagnostic imaging that can help veterinarians improve patient care, support better patient outcomes, expand consultation capabilities, and enhance client interaction. This collection of articles from *Veterinary Economics* focuses on digital radiography, from its top benefits to your practice's bottom line, to help you determine whether digital radiography is right for your practice.

A Word about the Sponsor.....

Since 1967, MinXray, Inc. has been the leader in portable x-ray diagnostic imaging. MinXray digital systems are composed of the highest quality components and configured to provide superior digital images, exceptional reliability, and convenience, and offer the latest in both DR (direct radiography) and CR (computed radiography) digital imaging technology. Especially favored by equine practitioners but also available for small, mixed, or exotic animal practices, the reliability of MinXray

is second to none for in-clinic or ambulatory imaging. Available in both portable and mobile units, MinXray devices can be used when it is more efficient to bring the x-ray unit to the patient instead of the patient to the x-ray unit. With MinXray's commitment to bringing the highest quality, most compact imaging systems along with the latest technology to veterinary practitioners worldwide, the company's powerful, lightweight, portable units continue to be the "gold standard" for digital imaging.



Radiograph on the e-book cover provided by MinXray, Inc.

The joys of digital radiography



GETTY IMAGES

Sure, it'll be a benefit to your practice's medical care, but this technology can do wonders for your relationship with veterinary clients, too. *By Andrew Rollo, DVM*

For the holidays, the gift to our clinic was a shiny, new digital radiography unit. The technicians love how much time it saves and how they don't have to be as precise with technique. (Like multiplication tables and cursive writing, it appears technique will quickly become a thing of the past, too.) And as veterinarians, we love the views and the ability to zoom in, adjust the contrast, and do measurements, like vertebral heart scores and such.

But I think what's most beneficial about digital radiography is that we can share the X-rays with pet owners—and use them as a teaching tool. With our old unit, I'd have the radiographs on a viewer box down the hallway. On a discharge, I'd offer to show the client the images, and more than half would decline because they didn't know what they were looking at, they were

in a hurry, or they simply didn't want to follow me down some dark, cavernous hallway.

With digital radiographs, I can pull up the views in any exam room. The owners—

“What's most beneficial about digital radiography is that we can share the X-rays with pet owners—and use them as a teaching tool.”

even if they wanted to—can't escape. But most don't want to escape—they're interested in what I have to tell them. Even if the X-ray is normal, I still think it's beneficial to let them see what their hard-earned \$149 paid for. And most are interested to see what their pet's kidneys look like or where the spleen is located. I'll show them why we took the radiograph in the first place and what I was

looking for. Digital radiography enhances our ability to embrace one of the cardinal reasons we became doctors: to teach.

What's also great about digital radiography is the ability to share—we can put the image in the report going home, send it on a disc, email it to a client, or have them look it up on the Internet. The ability to easily show the image in so many different formats adds value to the client.

When a client brings a pet to us, they either want to make sure the pet is well or they want to know what the problem is. But either way, the questions soon follow: How much are the radiographs? Should I have them taken now? And is it really of value? By having diagnostic tools such as digital radiography at hand, we can easily answer that last question by showing them the value.

Andrew Rollo, DVM, is an associate at Madison Veterinary Hospital in Madison Heights Michigan and a Veterinary Economics Editorial Advisory Board member.

Do you do digital?

A new study finds that most veterinarians still use film-based radiography, but digital radiography is up and coming.

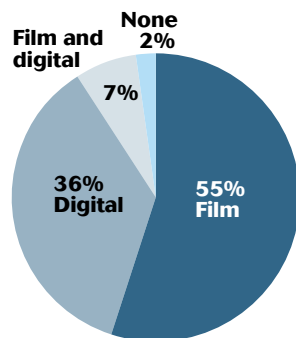
By *dvm360.com* staff

Most of you probably want digital radiography in your practice, but you don't think you can justify the expense. Brakke Consulting's latest survey on the use of digital radiography in small-animal practices shows you're not alone.

Fifty-five percent of the more than 300 practitioners surveyed still use film exclusively, but digital is growing all the time. Funny thing is, lots of veterinarians aren't sure what kind of digital radiography machine they've got. See below for how the numbers break down right now.

Taking pictures

Types of radiography used in practice



Types of digital radiography used in practice

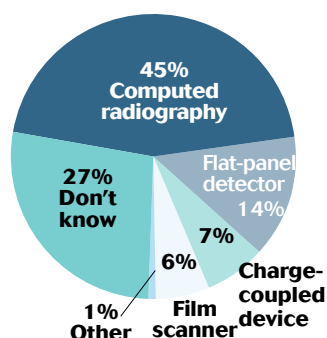
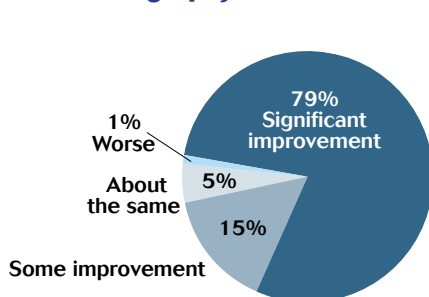


Image quality of digital radiography vs. film



Data source: Small Animal Veterinary Digital Radiography Survey by Brakke Consulting

Find it all here
dvm360

Radiography matters DR, CR, CCD—say what?

Find out how today's digital radiography systems work and what sets them apart from each other.

Visit dvm360.com/digitalradiography

for a peer-reviewed primer on the basics from Dr. Sarah Puchalski, DACVR, at the Department of Surgical and Radiological Sciences at University of California-Davis.



[Nail down] your digital radiography fees

You've taken the plunge and invested in digital radiography. Here's how to charge for your services. *By dvm360.com staff*

Dr. Ruth Sobeck was losing business. As an equine practitioner in Palos Verdes, Calif., Dr.

Sobeck's competition has always been tough. Five practices in the area fight for business with out-of-town mobile clinics. So Dr. Sobeck must make every effort to provide the highest-quality medicine to her patients. But five years ago, she saw those efforts slipping away.

An out-of-town practice was the first to invest in digital radiography. Almost instantly, Dr. Sobeck began losing clients who fawned over the new technology. Fearing a major hit to her practice's bottom line, she began looking into digital radiography equipment, but her accountant advised her that it wasn't feasible at the time. But radiographs weren't the only services Dr. Sobeck was losing to other practices. She also saw a decrease in diagnostics, treatments, and what she calls "while you're here" services—those add-ons that clients don't necessarily plan ahead for.

Dr. Sobeck soon realized she couldn't afford not to invest in digital radiography. A year later, she took the plunge. But after the initial excitement of her new purchase wore off, Dr. Sobeck realized she had a tough challenge ahead, one many veterinarians in her situation face: setting digital radiography fees. She consulted fee surveys and weighed the

value of the new technology to come up with her ideal pricing. Dr. Sobeck eventually found a solution, but are you making the most of your equipment and charging appropriately for the service?

Pick your philosophy

First, you'll want to determine your underlying fee-setting philosophy, says Dr. Mark Baus, president of Fairfield Equine Associates in Newtown, Conn. There are two ways to compete in the digital radiography world: by offering the best price or by offering the best service. Dr. Baus prefers service. By taking good radiographs, writing a comprehensive report about the findings, and putting in place an archiving system that allows images to be easily read and transferred, you'll offer your clients a level of service that will earn you their trust and confidence—and their business.

Just as with any other service, there might be other practices in your area that offer a lower price for digital radiographs. But do they offer the same service? Do their clients leave feeling satisfied and informed? Are they paying for other services? Most clients are glad to pay a little more to receive top-notch care for their horses.

Next, there are two ways to charge for the images themselves, says Wilson Taliaferro, practice manager for Dr.

Cooper Williams in Hampstead, Md.: by setting a fee per study (series of images taken during a single session) or a fee per image. Taliaferro prefers charging per image because of the "while you're here" factor, which prompts clients to ask for more images on the fly once the equipment is set up. If you charge per study, it's likely you won't always capture all possible revenue.

Find a balance

To find the right digital radiography fee, you have to balance making a profit with putting a major strain on your clients' budgets. Charge too little and you'll struggle to pay off the equipment. Charge too much and your clients will look elsewhere for more affordable service. A good place to start is by checking out the fees of your competitors who offer digital radiography to get a sense of what clients in your area are paying. Researching fee surveys can give you more comprehensive and wide-ranging information. But don't rely too much on this research, Dr. Baus says. "The entire veterinary industry charges too little for its services," he says. "And many fee studies are outdated and therefore inaccurate by the time they're published."

Once you've done your research, it's time to crunch numbers. First, take a look at your books and figure out how

many radiographic studies you perform per year. Divide the total number of views taken by the total number of studies performed to find your views-per-study rate.

Next, consider your fixed costs. First, of course, is the cost of the digital radiography equipment. The depreciable useful life of a typical piece of new equipment is five years. So if you purchased a machine for \$70,000, plan on a \$14,000-per-year expense. But realize that equipment considered state-of-the-art five years ago isn't so impressive anymore. So do some homework on upgrade costs and build these into your budget. Next, you'll have interest costs, equipment insurance, property taxes, a service contract for off-site storage, and radiation safety expenses. Divide these costs by your average number of studies per year to find your cost per study.

You probably don't just want to break even on digital radiography, so you'll also need to set a desired return on investment. Taliaferro recommends at least 33 percent, especially if your compensation is production-based. So multiply your costs per study by 1.33 to find your charge for the fixed costs of radiographs.

Labor through the numbers

Next, you'll need to consider your variable costs. This encompasses the staffing and labor costs involved with taking digital radiography images. Do you have a technician who helps with studies? If not, ask yourself, "Am I comfortable having a client hold this expensive piece of equipment?" Letting a trained technician handle the equipment will help you—and your

insurance company—breathe easy. You'll also want to charge for any time spent on office work or bookkeeping involved in the study.

Taliaferro prefers to charge by the tenth of an hour. At an hourly billable rate of \$90 per hour for a technician, he calculates 0.1 hours (a selling price of \$9) for setting up and breaking down the equipment and at least 0.2 hours (a selling price of \$18) for assisting with imaging. Use a similar formula to find the fees for your services, including shooting the images, evaluating the images, and communicating with the client.

Keep in mind that these machines aren't indestructible—each use contributes to the machine's wear and tear. And if you're just taking two lateral views of front feet, you'll need to make sure you're charging appropriately. So consider charging a setup fee to complement your per-image fee and boost revenue. Typical setup fees range from \$30 to \$50 (similar to a per-image fee). If you're concerned about charging for setup, you can consider lowering your per-image fee. Though Dr. Baus doesn't typically condone lowering fees, owners in lower-income areas may have little choice.

Make an assessment

Add your selling prices for each fixed cost and for your variable costs to find your selling price per view. Does it seem high or low? How does it compare to your competitors? Don't feel locked into the number you've come up with, Taliaferro says. If a certain study, such as a repository or prepurchase study, requires numerous views, you may be able to charge a little less. But if you feel you have extra room to mark up, go

for it. Keep the perceived value of your services in mind, though. If clients don't feel they're getting the best service for their money, they'll take their check-book elsewhere.

Once you've decided on a fee, the real work begins. Look at your books and talk to your clients. Is your fee working? If you're pleased with revenues and your clients are happy, congratulations. If not, tinker with the number until you find what works.

Along with generating revenue for your practice, digital radiography can strengthen the bond between you and your clients and improve the level of care you provide their horses. So show them the radiographs. Burn them a CD with the images. Get them involved in the process of caring for their horse. "In a time of economic concern, communicating about the value of your services is more important than ever," Taliaferro says. "Make clients feel like you're part of their team."

Luckily for Dr. Sobeck, her clients' expectations made her fee increase a non-issue. And because they were so impressed with the technology, the ones who'd left came flocking back. After some tweaking, Sobeck has found the perfect fee for her clients, and business has never been better.

You have the technology, and you provide the best level of service and medicine. But are you charging for it? And do your clients realize the value of the services you're providing? "It's important to think about how you're pricing your services, but it's more important to think about the value you're providing," Taliaferro says. "The difference between a great doctor and a mediocre doctor is their communication with their client."

Dr. Andy Rollo says

DR saves time and money



A TRADITIONAL RADIOGRAPH TOOK DR. ROLLO ~10-15 MINS:

- > Took image, returned patient to holding area
- > Developed film
- > Tracked down DVM
- > DVM made diagnosis
- > Patient returned to exam room



\$2,600

What Dr. Rollo estimates the practice spent a year on film, chemicals, maintenance calls for the old unit (**\$216.13 per month**)

HOWEVER...

1 in 3

Radiographs using the old system were retakes, according to Dr. Rollo. He says retakes cost about **50 cents per film**, plus **\$1 to \$2 of technician time** for each retake.

RETAKES TAKE ADDITIONAL TIME

- > Veterinarian finds image is not diagnostic
- > Team member retrieves patient for another x-ray
- > Again get patient in position—recruit additional team members for restraint if necessary
- > Take and develop one or more additional images
- > Veterinarian reads multiple x-rays for diagnosis
- > Patient returned to exam room



Andrew Rollo, DVM, is a Veterinary Economics Editorial Advisory Board member and an associate at Madison Veterinary Hospital in Michigan that upgraded to digital radiography in December 2012.

30%

Increase in the radiographs clients agreed to once Dr. Rollo's practice converted to DR.



GETTY IMAGES

Digital radiography caseload calculator

To find out whether your caseload warrants the digital radiography investment, download an online spreadsheet from Gary Glassman, CPA, at dvm360.com/caseloadcalc.

Gary Glassman, CPA, is a partner with Burzenski and Co. P.C. in East Haven Conn. and a Veterinary Economics Editorial Advisory Board member.

An example of a caseload calculation:

Caseload Input	
REVENUE GENERATION	
Estimated Number of X-Ray Cases per Year	275
Estimated Charge per Case	\$ 216.00
Desired Profit Margin Percentage	100.00%
COST OF EQUIPMENT	
Cost of X-Ray Unit	\$ 18,000
Estimated Life of X-Ray Unit (Years)	15
Cost of DR Unit	\$ 75,000
Estimated Life of DR Unit (Years)	7
Cost of Maintenance Contracts (Annual)	\$ 6,000
Cost of Insurance (Annual)	\$ 800
Cost of Building Space (Annual)	\$ 1,280
COST OF TIME	
Cost of Technician Time per Case	
Technician Minutes per Case	10.0
Cost of Technician per Minute	\$ 0.29
Cost of Doctor Time per Case	
Doctor Minutes per Case	10.0
Cost of Doctor Time per Minute	\$ 0.75
Hospital Overhead per Minute	\$ 1.20

Caseload Calculator	
FIXED COST PER CASE	
Cost of X-Ray Unit	\$ 4.36
Cost of DR Unit	\$ 38.96
Cost of Related Maintenance	\$ 21.82
Cost of Related Insurance	\$ 2.91
Cost of Building Space	\$ 4.65
Total Fixed Cost per Case	\$ 72.70
VARIABLE COST PER CASE	
Cost of Technician Time	\$ 2.90
Cost of Doctor Time	\$ 7.50
Overhead Cost	\$ 24.00
Total Variable Cost per Case	\$ 34.40
TOTAL COST PER CASE	\$ 107.10
PROFIT @ 100.00%	\$ 107.10
PRICE PER CASE	\$ 214.20
REVENUE ANALYSIS	
ESTIMATED TOTAL REVENUE PER YEAR	\$ 59,400
ESTIMATED COST + PROFIT MARGIN PER YEAR	\$ 58,905
DIFFERENCE: CASELOAD JUSTIFIED	\$ 495

DR comparison chart

Manufacturer name Website Year founded	No. of veterinary CR or DR units in use	Model name	Portable?	PACS included?	Base price
ClearVet Digital Radiography clearvetdigital.com 2001	1,000+	ClearVet CR eco and ClearVet CR (CR models); ClearVet DR (single-CCD DR); ClearVet FP (flat-panel DR)	Yes	Yes	\$24,950 (CR eco); \$39,950 (CR); \$49,950 to \$64,950 (DR); \$59,950 (FP)
IDEXX idexx.com 1984	4,000+	IDEXX I-Vision CR (CR); IDEXX I-Vision DR and IDEXX EliteVision (flat-panel DR models)	Yes: EliteVision equine	Yes	Contact sales rep
Diagnostic Imaging Systems vetxray.com 1983	375	AllPro ScanX, ALARA CR4000, iCRco Chrome, iCRco 3600 (CR models); DRTECH 8x10 DR2500, iRay 14x17 dR3500C, iRay 17x17 DR4300C, Perkins Elmer 14x17 Cassette-size Wireless DR3500C-SW (DR Flat flat-panel); Naomi vDR HG+ 8x10, Naomi vDR HG+ 10x12, Naomi vDR HG+ 14x17 (CCD array DR detectors)	Yes	"Mini-PACS" optional	\$18,000 to \$26,000 (CR models); \$23,000 to \$29,000 (CCD-array DR models); \$32,000 to \$45,000 (flat-panel DR models)
Fujifilm Medical Systems fujiprivatepractice.com 1934	2,000+	FDR D-EVO (flat-panel DR); Prima T2 (CR)	Yes	Yes	Contact sales rep
Cuatro cuatro.com 2007	1,500+	CloudDR High Definition Digital Radiography, Slate 4, Slate 4 Mini and Uno 4 (flat-panel DR)	Yes: Uno 4, Slate 4, Slate 4 mini and Slate 3 Plus	Yes	Mid-\$30,000s to mid-\$50,000s
Vetel Diagnostics vetel diagnostics.com 1999	2,000 (Fujifilm), 1,200 (Atlain), 1,000 (Trixel Empower 171 Csi); 50 (Perkin Elmer); 80 (Trixel Empower 3543 Wireless)	Fujifilm Fuji Prima T2 (CR); Atlain Envision 1717G, Trixel Empower 1717 Csi, Perkin Elmer Empower Xrpad Wireless 1417 and Trixel Empower 3543 Wireless (flat-panel DR models)	Yes: Fujifilm Fuji Prima T2 (CR) and Trixel Empower 3543 Wireless	Yes	\$27,950 (Fujifilm Fuji Prima T2); \$39,950 (Atlain Envision 1717G); \$49,950 (Trixel Empower 1717 Csi); \$59,950 (Perkin Elmer Empower Xrpad Wireless 1417); \$69,960 (Trixel Empower 3543 Wireless)
iM3/Durr Medical im3vet.com 1988	630	CR7 (CR)	Yes	PACS optional	\$11,980
MinXray minxray.com 1967	Confidential	SA 100AP.DR (flat-panel DR); Enduras; Vet Rocket X-1	Yes: Enduras; Vet Rocket X-1	PACS optional	Contact sales rep
Sound-Eklin soundeklin.com 1996	6,500+	SMART DR 1417, SMART DR 1717, TruDR cSeries 1417, Sprint Ultralight DR and Sprint AIR Ultralight DR (flat-panel DR)	Yes: Sprint Ultralight DR and Sprint AIR Ultralight DR	Yes	Price based on configuration
Sedecal vetray.com 1994	2,500+	DX-V, DX-C, Platinum DX-700, EPX-1, EPX-2, WEPX-1 and WEPX-2 (flat-panel DR models); DVR, DX-6, DX-9 and DX-16 (single-CCD DR models)	Yes: EPX-1 and EPX-2	Mini-PACS and Full PACS are included (one or both depending on equipment)	\$19,000 to \$65,000
ALLPRO Imaging allproimaging.com 1962	1,000+	ScanX PRO, ScanX Trek and ScanX Duo (CR)	Yes	Mini-PACS included	\$10,000 to \$24,000

DEFINITIONS

COMPUTED RADIOGRAPHY (CR)

CR systems were developed in the 1980s. The film screen combination is replaced by a photostimulable storage phosphor (PSP) that is loaded in a protective cassette. CR is the cheapest of the digital-era alternatives. CR has a broad dynamic range, excellent resolution and image manipulation algorithms that are equivalent to DR.

DIGITAL RADIOGRAPHY (DR)

Digital radiography systems can be divided into direct and indirect systems. In direct DR, x-rays are directly converted to an electronic signal without a light intermediate. Semiconductors detect the x-rays and create a small charge or current that is detected and converted to an electrical signal. Indirect DR systems use a scintillation x-ray detector plate in which the x-ray information results in a light flash from the scintillation plate that is then registered from a light flash to an electrical signal. The electrical signals are then processed into an image. DR images have excellent dynamic range and resolution and are ideal for the impatient patient, as images are available within four to six seconds.

PACS

PACS (Picture Archiving and Communication System) is a system to allow for retrieval of image data, review, manipulation, interpretation and storage. A good PACS system has three key components. The first is a central storage server that is on site with dual redundant off-site back up for when the hard drive crashes. The second component is a good review workstation that includes several high-grade, high-resolution (1 to 2 megapixels) grayscale monitors. The third component is a high-quality, dependable viewing software for evaluation, review and manipulation of images.

*Clifford Berry, DVM, DACVR
2010 CVC Kansas City proceedings*

DICOM

DICOM (digital imaging communications in medicine) is a set of comprehensive communication standards developed to promote interoperability of digital imaging devices in medicine. DICOM is the tool that permits standardized communication among various devices. Several different types of images—e.g. JPEG, RLE, JPEG-LS, JPEG 200—can be used in DICOM files. While DICOM is commonly referred to as a type of image, it is not—it's an image format. DICOM files consist of image pixel data and other precise attributes combined with services (e.g., commands for transmitting data).

*Jonathan Shiroma, DVM, MS, DACVR MedVet
Medical Center for Pets for Veterinary Medicine, December 2006*

Warranty details	Training available
1 year on system and cassettes, 3 years on phosphor plates (CR eco, CR); up to 5 years on system (DR); up to 3 years (FP)	In-clinic
1 year	In-clinic and online
2 years	Online
1 year (DR), 2 years (CR)	In-clinic
Warranty term options are available and extendable based on customer needs.	In-clinic and online
1 year labor, 2 years parts (Fujifilm Fuji Prima T2); 2 years labor, 2 years parts (Atlain Envision 1717G); 3 years labor, 3 years parts (Trixell Empower 1717 Csi); 2 years labor, 2 years parts (Perkin Elmer Empower Xrpad Wireless 1417); 3 years labor, 3 years parts (Trixell Empower 3543 Wireless)	In-clinic and online
2 years	Online
5 years on X-ray unit; 2 years on DR package	In-clinic
1 year; 1 to 6 additional warranty years available	In-clinic for installation; additional remote/in-person training available on request
3 to 5 years on parts, depending on system; 1 year labor	In-clinic
1-year swap warranty	In-clinic and online