A BRAND NEW HARVEST: ISSUES REGARDING PRECISION AGRICULTURE DATA OWNERSHIP AND CONTROL

James R. Walter[*]

I. Introduction 431
II. Precision Agriculture Technology 433
A. What is Precision Agriculture? 433
B. How Does the Technology Work? 434
1. Yield Monitors 434
2. Global Positioning System (GPS) 435
3. Grid Soil Sampling, Scouting, and Remote Sensing (RS) 437
4. Geographic Information System (GIS) 437
5. Variable Rate Technology (VRT) 439
III. Importance of Precision Farming Data 439
IV. Understanding the Potential Legal Concerns of Data Ownership/Control 440
A. Completely Farmer Owned Systems 440
B. "For Hire" Systems 440
1. Payment Theory 441
2. Medical Records Analogy 441
C. Partially Owned Farmer Systems 443
D. Remote Sensing 443
E. Landlord/Tenant 444
F. Databanks/Clearinghouses 444
V. How Are Data Ownership and Control Problems Currently Addressed? 445
VI. Suggestions for the Future 445
A. The Wise Farmer 445
B. The Wise Legal Practitioner 445
VII. Conclusion 446

I. INTRODUCTION

At the start of this century "precision agriculture" more often than not referred to a farmer's ability to keep a stubborn mule walking in a straight line as he plowed

---

[*] Associate Attorney, Boyle, Cordes & Brown, DeKalb, IL; J.D., 1997, Drake University Law School; B.S., 1994, University of Illinois.

the soil.[1] Around the 1950s that same term may have meant being able to cut a clean corner with a new tractor the farmer was driving.[2] As we near the end of the twentieth century, the term "precision agriculture" is taking on an entirely new meaning.

Throughout the centuries, changes in technology have dramatically impacted agricultural production around the world. Today, new developments in information technology are creating what some are calling a "revolution" in the farm production sector.[3]

"Precision agriculture," "precision farming," and "site-specific farming" are all terms with the same meaning. Essentially, it means utilizing new technologies in the form of satellites, sensors, and highly detailed maps in order to manage entire fields as individually related small plots of land.[4] Through this type of management, a farmer can make more efficient use of production inputs in addition to monitoring production output on both a micro and macro scale.[5]

Both the technology and its uses are still in their early stages in the field of mainstream production agriculture. At the start of 1996 it was estimated that approximately 7500 of the 285,000 farmers in the United States were using such a system.[6] That figure had increased to approximately 9000-11,000 farmers by the start of 1997.[7] Nonetheless, fewer than five percent of American farmers currently use precision agriculture technology systems on their farms.[8] However, many experts claim that most large-scale farmers will be utilizing the new technology in some form within a decade.[9]

A question remains in many minds as to whether or not the implementation of this new technology will be economically viable, and ultimately beneficial to the industry.[10] Nevertheless, many experts argue that "the concept of optimizing crop

---

1. *See* Bill Graham, *Technology Moves Into New Fields*, KAN. CITY STAR, Feb. 13, 1997, at 1.

2. *See id.*

3. *See* J. Kim Kaplan et al., *High-Tech Fattens the Bottom Line*, AGRIC. RES., Apr. 1996, at 4; *see also* Barbara Carton, *Farmers Begin Harvesting Satellite Data to Boost Yields*, WALL ST. J., July 11, 1996, at B4 (hesitating to characterize this new technology as a revolution but instead equate its development to the mechanization of production agriculture).

4. *See* MARK MORGAN & DAN ESS, THE PRECISION-FARMING GUIDE FOR AGRICULTURISTS 2-3 (John E. Kuhar ed., John Deere Publishing 1997).

5. *See id.* at 4.

6. *See* Susan N. Reuter, *Harvesting High Tech Data*, FIN. POST, Jan. 27, 1996, at 78.

7. *See* Steven H. Lee, *Farmers Plow New Ground with Technology,* DALLAS MORNING NEWS, Mar. 2, 1997, at 1H.

8. *See* Barbara Carton, *Farmers Begin Harvesting Satellite Data to Boost Yields*, WALL ST. J., July 11, 1996, at B4.

9. *See id.*

10. *See* Kaplan et al., *supra* note 3, at 4; *see also* Ronald E. Yates, *High-Tech Farming Sows Success: Satellites, Computers Show Way to Better Production*, CHI. TRIB., May 12, 1996, at 1 (explaining that with implementation of most new technologies into industrialized systems, the learning curve is steep, the technology rather expensive, and many questions still exist regarding ultimate efficacy).

production based on in-field variability is so fundamental that this enabling technology is here to stay."[11]

Assuming this technology is here to stay, a variety of legal issues arise relating to the ownership and control of the data generated, assimilated, and manipulated through precision farming activities. "One unique legal issue that might be associated with the development of precision farming technologies concerns who owns the different forms of field level data on yield and input performance being generated by the technology."[12] "As we accumulate more and more data, usage and ownership of this information becomes an overriding issue."[13]

Now most of the focus on precision farming is on the technology itself—how it works, what works best, how much it costs, and how to generate and use the information. "When precision farming was first introduced, producers were more interested in searching for answers than worrying about where their data was going."[14] However, stories are starting to surface about disagreements between tenants and landlords, producers and dealers, and landlords and dealers.[15] Some have suggested that eventually the issue of ownership and control of the data will necessitate getting lawyers and the courts involved to help sort things out.[16]

This Note is intended to sow the first seeds of scholarly discussion about this issue. Because the technology is so new and is only starting to be widely understood, little debate has evolved over the question of data rights. Research for this Note disclosed that few sources were available which discussed the question of data ownership and control. Therefore, certain assertions may be made in this Note that may not have the backing of scholarly precedent. Perhaps that is both the blessing and curse of being among the first to address an entirely new legal issue.

This Note is not intended to serve as a complete legal guide for those involved in precision agriculture. Rather, it is an attempt to educate those in the legal profession about what precision agriculture is, how it works, what legal issues exist concerning data ownership and control, and what potential solutions may be available. Armed with a better understanding of the issues, the legal profession will be better able to serve the needs of those in the agricultural sector who request answers to their many questions.

---

11. MORGAN & ESS, *supra* note 4, at 3.

12. Neil D. Hamilton, *Plowing New Ground: Emerging Policy Issues in a Changing Agriculture*, 2 DRAKE J. AGRIC. L. 181, 190 (1997).

13. Kent Western, *Data, Data, Who Owns the Data?*, PRECISIONAG ILLUSTRATED, Mar.-Apr. 1997, at 15. (PrecisionAg Illustrated is a new publication devoted entirely to this new industry. This citation is to the first published edition of the magazine. Interested parties may reach the publication by phone at (314) 527-4001 or by e-mail: progress@precisionag.com).

14. *Id.*

15. *See id.*

16. *See id.*

II. PRECISION AGRICULTURE TECHNOLOGY

Before engaging in any discussion of the legal issues regarding data rights, it is necessary to have a detailed understanding of what precision farming is, how it works, what it is used for, and why it is so important. Without such an understanding, the legal issues and their ramifications cannot be fully appreciated.

A. *What is Precision Agriculture?*

Precision agriculture, precision farming, or site-specific farming are all synonymous.

> Precision farming entails the use of some high-tech equipment of assessing field conditions and applying chemicals and fertilizers. Through the use of technology such as satellite positioning systems, electronic sensors, controllers, and sophisticated software, the farmer can create a very detailed picture of his or her operation. Managing small areas within a field to reduce chemical use and improve productivity is the goal of precision farming methods.[17]

"Precision farming is a method that links information about growing conditions to sophisticated, computer-run farm equipment, allowing farmers to treat areas within a single field differently."[18] The technology in use today allows farmers to measure, analyze, and handle in-field variability that was previously known to exist but was not easily determined or managed.[19] Being able to handle productivity variations within a field in order to maximize yields has always been a goal for farmers and the technologies now available allow them to reach this goal.[20]

B. *How Does the Technology Work?*

There are many components to a precision farming technology system.[21] Not all components need be utilized together, as each serves as a different tool which any individual farmer may or may not feel the need to use. Following is a list of the different components frequently found in such systems and a brief explanation of how each one works and what purpose it serves.

---

17. MORGAN & ESS, *supra* note 4, at 1.
18. Kaplan et al., *supra* note 3, at 5.
19. MORGAN & ESS, *supra* note 4, at 3.
20. *See id.*
21. *See id.*

1. *Yield Monitors*

For many farmers the purchase and use of a yield monitor is often the first tentative step into the field of precision farming.[22] Historically, in order to determine yields during harvest, farmers had to calculate the number of bushels per acre by the rather slow and cumbersome process of weighing an amount of grain of a known moisture content harvested from a plot of land of a known size.[23] If the sample size was sufficient, the farmer could calculate a relatively accurate average yield over the particular plot of land—whether an entire field or smaller test plot.[24] This has changed with yield monitors.

Today, yield monitors allow instantaneous yield measurements to be displayed and recorded on-the-go.[25] The yield monitors are devices composed of a series of electronic sensors and a computer that, when coupled with a combine, are able to gather, calculate, display, and record crop yields.[26] Typically, yield monitors consist of electronic grain flow sensors, grain moisture sensors, ground speed sensors, a computer, and display and recording device.[27] Once calibrated, yield monitors are able to provide instantaneous feedback to the farmer in the combine cab and give accurate, on-the-go yield information approximately every two to three seconds as the crop is harvested.[28] The scientific nature of how these devices work is quite complicated and well beyond the scope of this Note. Only a rudimentary knowledge of how the technology works is important for understanding the legal issues to be discussed later.[29]

Through the use of yield monitors, farmers, from the seat of their combines, can make numerous intuitive observations—correlating yield data with variations in seed varieties, drainage, populations, pest damage, weed control, and compaction.[30] At this basic level, while the information is compiled and assimilated in the farmer's head, it may also be recorded electronically onto a Personal Computer Memory Card International Association (PCMCIA) card for use later.[31] Many farmers claim seeing these hard numbers as they combine helps validate or contradict the management

---

22. *See* JoAnn Hays, *First Hands in Technology*, SUCCESSFUL FARMING, Dec., 1996, at 43; MORGAN & ESS, *supra* note 4, at 30.

23. *See* MORGAN & ESS, *supra* note 4, at 30-31.

24. *See id.* at 31.

25. *See id.*

26. *See id.*

27. *See id.*

28. *See id.* at 36.

29. For a more detailed discussion of the technology itself, see MARK MORGAN & DAN ESS, THE PRECISION-FARMING GUIDE FOR AGRICULTURISTS 1 (John E. Kuhar ed. 1997). (It may be purchased by contacting John Deere Publishing, Co., at 1-800-522-7448).

30. *See Access is Knowledge*, FARM INDUSTRY NEWS, Special Issue 1996, at 7 (special report sponsored by DowElanco).

31. *See* MORGAN & ESS, *supra* note 4, at 3.

decisions they made during the growing season.[32] Indeed, some farmers feel that this one device provides most of the new useful data farmers need for the first several years of implementing a precision farming system.[33] However, most experts note that this yield monitor information is most useful when data is gathered from multiple years' crops.[34] Most experts also note that this yield monitor information takes on new significance when coupled with a Global Positioning System (GPS).[35]

2. *Global Positioning System (GPS)*

The use of a GPS is such an integral part of most precision farming systems that the term "GPS farming" is sometimes used as a synonym for the entire concept of precision agriculture. However, it is only another tool, even though an important one, in the entire technological scheme.

"Developed by the United States Department of Defense (DOD), the GPS utilizes a constellation of twenty-four satellites which orbit approximately 11,000 miles above the earth."[36] Initiated in 1973, the GPS was developed to facilitate military troop movements and first gained fame during Desert Storm by providing unprecedented navigational accuracy for allied air and ground forces during the Gulf War in 1991.[37]

In 1995, GPS was declared "fully operational," meaning that the general civilian public could now use the system to determine a GPS receiver's position anywhere in the world, 24 hours a day, in all weather conditions, free of charge.[38] The system is designed so that at any time, while following their orbital paths, a minimum of four satellites will be "in view" of a GPS receiver located anywhere on the globe.[39] If a farmer has purchased a GPS receiver, the receiver will electronically measure its distance from each satellite and, through a process of triangulation, calculate its relative position on earth expressed in terms of latitude and longitude.[40] The GPS is currently being utilized by many civilian sectors besides farmers, including aviation, transportation, and recreation.[41]

---

32. *See* Kaplan et al., *supra* note 3, at 4; Lee, *supra* note 7, at 1H.

33. *See* JoAnn Hays, *First Hands in Technology*, SUCCESSFUL FARMING, Dec. 1996, at 43.

34. *See* Richard F. Dunn, Jr., *You Can Do Home Grown Research*, PRECISIONAG ILLUSTRATED, Mar.-Apr. 1997, at 22-23.

35. *See generally* MORGAN & ESS, *supra* note 4, at 2-3.

36. *See* Grant Mangold, *How Does Global Positioning Really Work?*, SUCCESSFUL FARMING, Feb. 1996, at 14.

37. *See* Kari Hudson, *Earth-Moving Equipment Gets Guidance from Above,* AM. CITY & COUNTY, Mar. 1, 1996, at 34.

38. *See* MORGAN & ESS, *supra* note 4, at 10-11.

39. *See id.*

40. *See* Hudson, *supra* note 37, at 34.

41. *See id.*

However, because GPS was originally intended for military purposes, the DOD "deliberately placed errors in the transmissions to ward off enemies."[42] "This signal error [coupled with other technical factors,] results in positional accuracy on the order of 300 feet."[43] While amazingly accurate in its own right, to be useful to farmers for agricultural purposes, the signal error must be corrected through use of a Differential Global Positioning System (DGPS).[44] Essentially, use of the DGPS involves the purchase and use of a radio receiver (coupled with a GPS satellite receiver) that enables the user to receive a corrected signal from a ground based radio broadcast tower at a known position.[45] These ground based radio broadcasts originate from several sources including locally based FM signals (which usually require a subscription fee), and the United States Coast Guard, which broadcasts a free differential signal from numerous sites along the Atlantic and Pacific Coasts, the Great Lakes, and several major inland waterways (including the Mississippi River).[46] Armed with the proper equipment, using GPS and DGPS a farmer can establish his exact global position within three to four feet.[47]

The benefit of the GPS to farmers is that coupled with other precision farming tools, it allows information to be pinpointed to an exact location on a particular farm. For example, coupling a GPS receiver with a yield monitor allows a farmer to equate a particular spot of his farm with its corresponding yield. Assuming the farmer has the proper computer mapping software, the farmer can then combine the yield data with the precise geographic location of each yield sample in order to generate a color coded yield map of his entire farm.[48] If this information is coupled with other sensory and scouting information, such as grid soil sampling, the value of the data increases.

3. *Grid Soil Sampling, Scouting, and Remote Sensing* (*RS*)

The use of GPS receivers, together with other precision farming tools and techniques, allows farmers to gather additional important information on their farming operations. Grid soil sampling involves dividing a field into rectangular or square shapes of several acres or less in size.[49] Each square is then assigned corresponding coordinates according to latitude and longitude and may be pinpointed

42. Gerard Aziakou, *Minnesota's High-Tech Farms Show Changing Face of U.S. Agriculture,* AGENCE FRANCE - PRESSE, Apr. 17, 1997, *available in* 1997 WL 2098097.

43. Mangold, *supra* note 36, at 14.

44. *See id.*

45. *See* MORGAN & ESS, *supra* note 4, at 17-21. As these highly technical matters are beyond the scope of this Note, please refer to MORGAN & ESS, *supra* note 4, at 17-21, for further explanation as to the technology used in DGPS.

46. *See id.*

47. *See id.* at 28.

48. *See id.* at 37-38.

49. *See id.* at 46.

using a GPS receiver.[50] A farmer or business organization whom the farmer hires, may then take precise soil samples and determine through chemical analysis the relative fertility levels of each individual grid in relation to nutrients such as Nitrogen (N), Potassium (K), or Phosphorous (P).[51]

A farmer or commercial crop scout may also use a GPS receiver to pinpoint problem areas of a field as found during the growing season. They can visually detect weed patches, drainage problems, pest infestations, and note and record the exact location of the problem in order to treat it at a later date.[52]

"Remote Sensing [(RS)] has also gained a lot of interest as a potential management tool for precision farmers. . . . In general RS is a group of techniques for collecting information about an object or an area without being in physical contact with that object or area."[53] A wide variety of RS tools exist, ranging from relatively simple moisture and weather sensors (used for such things as automatic irrigation) to aerial photography and satellite imagery, including infrared technology, to determine the health and vigor of a growing crop.[54] All of the data gathered from grid soil testing, crop scouting, and remote sensing can be combined (or parts of it, depending on the tools utilized) with the corresponding yield monitor data gathered with the GPS, increasing its value. If this wealth of information is then integrated into a Geographic Information System (GIS), the value of the data becomes quite impressive.[55]

4. *Geographic Information System* (*GIS*)

"A geographic information system (GIS) maps data and draws analytical relationships between location and other data such as yield . . ." soil types, fertilization levels, and weed pressure.[56] "Precision farming activities like yield monitoring, crop scouting, or grid soil sampling provide data about the variation in crop and soil conditions throughout a field. This data must then be processed into maps to provide serviceable information."[57]

The value of a GIS is that it provides a way to assimilate the raw data gathered from a farm and displays it in a way that is easy to understand and utilize.[58] It is easiest to think of the data in terms of layers, in which each layer is a map (either

---

50. *See id.* at 46-50.

51. *See id.*

52. *See id.* at 7.

53. *See id.* at 51.

54. *See* Aziakou, *supra* note 42; *Access is Knowledge, supra* note 30.

55. *See Putting Information to Work,* FARM INDUSTRY NEWS, Special Issue 1996, at 10 (special report sponsored by DowElanco).

56. Grant Mangold, *Farming with Precision*, SUCCESSFUL FARMING, Dec. 1996, at 40 [hereinafter *Farming with Precision*].

57. MORGAN & ESS, *supra* note 4, at 65.

58. *See Putting Information to Work, supra* note 55, at 10-11.

physical or digital) that expresses a particular value (for example, nitrogen levels) for a particular geographic location.[59]

The amounts of data the technology is able to collect is immense. "That is one of the problems of computers: They can generate enough data to drown a mathematician, let alone a farmer. One way to make the data more user-friendly has been to translate the data into . . . color [coded] maps."[60] GIS uses sophisticated computer hardware and software to digitally manipulate the raw data gathered on a farm in order to create detailed field maps (usually by layers as previously explained) which the farmer can then use to make management decisions.[61]

Creating maps through use of a GIS is relatively complicated and requires a certain amount of computer expertise and financial investment.[62] Farmers have a choice as to whether they generate their own maps using their own computer hardware and software or whether they pay a professional service or supplier to create the maps and do the computer analysis for them.[63] "Farm co-ops, private crop consultants, or soil testing services are just a few of those who professionally analyze data."[64]

Once these maps are created, they can be displayed in print form, enabling farmers to analyze the data in a graphical context, or in electronic form. In electronic form, the GIS can be used to create a digital map which, when combined with the use of Variable Rate Technology (VRT), allows another valuable use of the data.

5. *Variable Rate Technology* (*VRT*)

All the previous sections of this Note describe technology used in precision farming systems to collect and assimilate data into useful information. Variable Rate Technology (VRT) is also referred to as Variable Rate Application (VRA). VRT allows the producer to use previously gathered site-specific data to vary the application rates of cropping inputs such as seed, fertilizer and pesticides.[65] "[I]nstead of covering a large tract with a uniform amount of seeds, fertilizer or herbicides, for example, they can spread just the right amount needed on each square yard."[66]

Once equipped with the proper VRT and GPS components, farm equipment, such as planters, fertilizer spreaders and sprayers, can draw upon a farm's digital map

---

59. *See id.* at 10.
60. Kaplan et al., *supra* note 3, at 5.
61. *See* MORGAN & ESS, *supra* note 4, at 65.
62. *See id.*
63. *See id.* at 65-66.
64. *Id.* at 65-66.
65. *See id.* at 79.
66. Barbara Carton, *Farmers Begin Harvesting Satellite Data to Boost Yields*, WALL ST. J., July 11, 1996, at B4.

created through the GIS and automatically vary input applications.[67] The appropriate recommended application levels are determined beforehand by a farmer or service provider (such as a fertilizer company), and as the equipment travels across the field it automatically adjusts application rates on-the-go to achieve those pre-determined levels.[68]

III. IMPORTANCE OF PRECISION FARMING DATA

After gaining a basic understanding of *how* the technology works, it is important to reflect upon and understand the importance of the information itself before exploring the legal ramifications of the control and ownership of the compiled data. "Information produced on the farm truly represents power."[69] "As information-based technologies rapidly expand, the valuable roles they will play are diverging along two distinct paths. One path involves using the power of information for profit. The other path may be less attractive, but is no less important. Information also can be used for protection."[70] This information is already being used by farmers to help generate increases in efficiency and profit, but in the near future it may also be used to prove regulatory compliance (such as pesticide application and groundwater pollution through runoff).[71] "Detailed information from such sources coupled with new research technologies can be of significant assistance in improving the efficiency of use of farm inputs, increasing crop productivity, and reducing the off-site movement of pollutants."[72]

Ultimately, through the use of this technology, farmers will be creating a databank of years worth of useful data and information. Farmers will be able to draw upon this wealth of information to make critical management decisions in the areas of production, marketing, and specialty contracting with dramatic economic results, as well as using the information for self protection.[73]

Because producers are now beginning to appreciate the tremendous potential value of this data, the question of who owns or controls the data is slowly rising to the forefront.[74] The question of who owns or has access to precision agriculture data

---

67. *See generally* Chris Anderson, *Sun Ag's Tradition Assures Its Future*, THE PANTAGRAPH, Feb. 19, 1996, at D1. *See also* MORGAN & ESS, *supra* note 4, at 79, 93.

68. *See* Anderson, *supra* note 67, at D1.

69. *Power & Politics of Information*, FARM INDUSTRY NEWS, Special Issue 1996, at 14 (special report sponsored by DowElanco).

70. *Id.*

71. *See id.*

72. *Agricultural Research Programs Reauthorization: Hearings before the U.S. Senate Committee on Agriculture, Nutrition, and Forestry*, 105th Cong. (1997) (statement of Dr. William W. McFee, President, American Society of Agronomy).

73. *See Power & Politics of Information*, *supra* note 69, at 14-17; *Knowledge For Sale,* FARM INDUSTRY NEWS, Special Issue 1996, at 20 (special report sponsored by DowElanco).

74. *See* Western, *supra* note 13, at 15.

surfaces as the implications of the effects of this new informational technology on agriculture become apparent.[75]

IV. UNDERSTANDING THE POTENTIAL LEGAL CONCERNS OF DATA OWNERSHIP/CONTROL

The legal issues involved with precision farming can arise in a farmers specific factual scenario, and also generally with the parties involved in laying claim to the data.

A. *Completely Farmer Owned Systems*

The first scenario is one in which the farmer owns all of his precision farming equipment, gathers all of his data, generates his own GIS maps, does not share this data with any outside parties, and does not contract with any person or organization to gather, assimilate, use, or share his data in any form. With some certainty, it can be said this farmer owns and controls his data.[76] However, due to the high cost and complexity of a complete precision farming system, few farmers fall into this category.[77]

B. *"For Hire" Systems*

At the other end of the spectrum is the farmer who owns no precision farming equipment and instead enters into contractual agreements to hire an outside party such as a paid consultant or fertilizer dealer to gather all of the precision farming data from his operation. "Some advocates of private mapping are concerned about the ownership of the data when hiring someone else to generate the maps. Does the service provider own the data or does the farmer? And, where might this data end up being used? Presently these issues remain unresolved."[78]

1. *Payment Theory*

Some in the industry have asserted that the key to the ownership and control issue is payment for the data, and that the party who pays ultimately owns and

---

75. *See* Grant Mangold, *Who Owns the Data?*, SUCCESSFUL FARMING, Mar. 1997, at 18 [hereinafter *Who Owns the Data?*] (Grant Mangold is also the editor of *@g/Innovator*, a newsletter for agriculture information technologies. Interested parties can access a daily on-line version at <http://www.agriculture.com>).

76. *See Data Ownership: Protecting Rights,* FARM INDUSTRY NEWS, Special Issue 1996, at 18 (special report sponsored by DowElanco).

77. Cost of a complete precision farming system varies greatly but often approaches $20,000 to $30,000. *See* Reuter, *supra* note 6, at 78; Doug Fruehling, *Ag Technology Takes Farming to New Level*, PEORIA J. STAR, Jan. 30, 1996, at C1; Christine Lutton, *Cyberfarm*, FORBES, July 15, 1996, at 86; Steven H. Lee, *Farmers Plow New Ground with Technology,* DALLAS MORNING NEWS, Mar. 2, 1997, at H1.

78. MORGAN & ESS, *supra* note 4, at 66.

controls it.[79] Such a rule would certainly simplify matters, but unfortunately it is not that easy. "Paying for data does not ensure ownership or privacy."[80] It appears safer to say that generally if farmers pay someone else to generate the data for them, they only have *access* to it.[81]

2. *Medical Records Analogy*

Several experts in the field have suggested the medical field may be looked to for an analogy. "When individual farmers contract with a company for specific services, who actually owns the data? An analogy would be a patient who pays to find out if an arm or leg is broken. The patient pays for the information, but who owns the X-ray?"[82] This question was directly addressed in *McGarry v. J.A. Mercier Co.* by the Michigan Supreme Court in 1935:

> In the absence of an agreement to the contrary, there is every good reason for holding that X-rays are the property of the physician or surgeon rather than of the patient or party who employed such physician or surgeon, notwithstanding the cost of taking the X-rays was charged to the patient or to the one who engaged the physician or surgeon as a part of the professional service rendered.[83]

The court in *McGarry* also claimed that it was "common knowledge that X-ray negatives are practically meaningless to the ordinary layman."[84] Using this analogy so far, it would appear a farmer who does not possess the requisite knowledge and tools to collect and analyze his own data, but pays another to do so, may not have an ownership right in the data.

A "vast majority of states hold 'that medical records are the property of the physician or the hospital and not the property of the patient.'"[85] Courts in other jurisdictions have likewise held medical records and X-rays are the property of the doctor or hospital.[86] Whether or not a patient has *access* to his medical records varies according to jurisdiction. Some courts provide that access exists as a matter of property right.[87] However, it would appear that "granting a former patient [unlimited] access to medical records . . . is the exception rather than the rule in an

79. *See* Western, *supra* note 13, at 15.

80. *Who Owns the Data*?, *supra* note 75, at 18.

81. *See Data Ownership: Protecting Rights, supra* note 76, at 18.

82. Jan van Schilfgaarde, *Does Agriculture Compute?*, AGRIC. RES., Apr. 1996, at 2.

83. McGarry v. J.A. Mercier Co., 262 N.W. 296, 297 (Mich. 1935).

84. *Id.*

85. Estate of Finkle, 395 N.Y.S.2d 343, 344 (N.Y. Sup. Ct. 1977) (quoting Gotkin v. Miller, 379 F. Supp. 859, 866-67 (E.D.N.Y. 1974)).

86. *See id.* at 344-45.

87. *See In re* Gerkin, 434 N.Y.S.2d 607, 608 (N.Y. Sup. Ct. 1980).

overwhelming majority of our states."[88] Nevertheless, it is common for patients to have control over the dissemination of the content of their medical records as a matter of confidentiality, as it is common for professionals in the medical field to transfer copies of the patient's medical records between physicians when the patient requests.[89]

It is important to recognize that the discussion of rights relating to medical records is only an analogy to the precision agriculture field, but perhaps it has certain utility. According to another precision farming expert affiliated with a chain of regional cooperatives:

> I look at this just like the issue of medical records. . . . When you go to the doctor, the doctor compiles information on you. When it needs to be passed to a third party, the patient has to approve it. For us to process information, we have to have the raw data. But the farmer controls how that data is used, and who has access to it, and we will protect that right.[90]

Perhaps a further explanation for the reason why this is so important is in order:

> Let's say a farmer hires a supplier for the data collection . . . and the supplier originates the data and creates the digital image that drives a variable-rate fertilizer application. In this case the farmer paid for the service, he gets maps showing the analysis, and he gets the site-specific recommendation. But the product of the information — the map the supplier generated detailing how to apply the fertilizer belongs to the supplier.[91]

Assuming the farmer maintains his relationship with the same supplier, he will be able to continue to build a database of information taken from his farm every year. The data gathered becomes more valuable as the number of total crop years increase because patterns develop and variables such as weather decrease in significance.[92] The problem arises if the farmer ever decides to change suppliers, because if he does not own the database of information, he cannot take it with him.[93] Effectively the supplier has him locked in, unless he has access to the electronic database and digital maps or can at least control its dissemination to another supplier. Specifically what most farmers want to be able to take with them is the raw data so that they can continue to compile a database of information. They want the geographic reference

---

88. Gotkin v. Miller, 379 F. Supp. 859, 867 (E.D.N.Y. 1974).

89. *See id.* at 864-65; *Finkle*, 395 N.Y.S.2d at 346.

90. *Data Ownership: Protecting Rights, supra* note 76, at 18 (statement by Ron Milby, Precision Farming Coordinator for Growmark, Inc., Bloomington, IL).

91. *Id.*

92. *See* Jerri Stroud, *Techno-Farmers Get Precise Results*, ST. LOUIS POST-DISPATCH, Feb. 10, 1997, at 10.

93. *See* MORGAN & ESS, *supra* note 4, at 66.

points and the soil sample results, not necessarily the supplier's recommendations.[94] This is likely to be the issue on which a significant amount of the debate will focus.

C. *Partially Owned Farmer Systems*

Currently, most farmers involved with precision farming use a combination of their own equipment and that of commercial suppliers to gather and assimilate data.[95] "Farmers are realizing that they simply can't do it all themselves. To use these new technologies and resources, they need expert help."[96]

For farmers that fall into this category, the legal issues are essentially the same as those previously described. However, an added complication exists: What happens when the farmer *collects* his own data with his own equipment but hires a supplier to *manipulate* the data through something such as a geographic information system in order to make the physical and digital GIS maps and provide any further recommendations such as fertility rate guidelines for VRT applications? This might be analogized to the doctor/patient scenario by hypothesizing a patient is able to take his own X-ray picture with his own X-ray machine and then present it to the doctor to determine whether or not his arm is broken. Presumably in both cases the farmer/patient owns the information he made and provided to the supplier/doctor. Thus he should be able to obtain his data/X-ray after analysis and freely take it to another supplier/doctor if he chooses. Here again the debate will likely rage on—here not so much over who owns the data, but over who controls the access to the information.[97]

D. *Remote Sensing*

There are several other issues regarding the ownership and control of precision farming data. Farmers cannot control aerial or satellite data collection over their farm by means of some remote sensing (RS) devices.[98] Government projects involve data collection from both the air and the ground using RS equipment.[99] In addition, some military spy satellites that can photograph objects as small as a football will soon be available for commercial use.[100] "[F]or a few hundred bucks you may be able to get some photos of what's behind your neighbor's tall privacy fence. . . . Obviously there are some major invasion of privacy issues to be decided."[101] For the legal

---

94. *See* Telephone Interview with James E. Walter, Manager of Walter Farms (Apr. 22, 1997) (father of author and third year precision farmer).

95. *See Power and Politics of Information, supra* note 69, at 14-15.

96. *Id.* at 14.

97. *See Farming with Precision*, *supra* note 56, at 41-42.

98. *See Who Owns the Data*?, *supra* note 75, at 18.

99. *See id.*

100. *See* Graham, *supra* note 1, at 1.

101. *Id.*

practitioner, questions of property, privacy, and trespassing may not be limited to farmers directly involved with a precision farming system.

E. *Landlord/Tenant*

All farmers who farm land on a landlord/tenant basis, including those who are sole owners and operators of a precision farming system, may have to deal with future requests from landowners who seek data compiled from farming activities on their property. Some people have already expressed concerns about landlords who seek to obtain precision data from them—even after the landlord/tenant relationship has expired.[102]

Unless otherwise provided by agreement or contract, landlords who want precision data, but who have not helped pay for these services, will likely have to purchase such information from the farmer.[103] Some landowners already have an appreciation for the value of the data and are demanding provisions in their lease agreements that give them access to such information.[104] On the other hand, some farmers recognize the value of sharing the data with their landlords as a matter of maintaining a strong interactive relationship with them.[105] "If you give up the information you set a positive environment. The next time you are negotiating with a landowner in the area that Win-Win attitude will pay big dividens [sic]."[106]

F. *Databanks/Clearinghouses*

Finally, some have suggested that in order to fully utilize the potential of precision agriculture, farmers need to combine their data with other farmers in order to create large databases from which all can benefit from the collective knowledge of the group.[107] Questions exists as to who can best serve as a clearinghouse to assimilate this data, and in what form should it exist. One concern is that compiling electronic information at such data warehouses may make sensitive information available to others.[108] From a legal perspective there may even be future Constitutional issues such as the Fifth Amendment right against self incrimination. For example, could the EPA attempt to use farmer generated geographic data

---

102. *See* Tim Reinhart, *Who Owns the Information?* (posted Apr. 5, 1996) <reinhart@derf.cso.uiuc.edu> (hard copy of electronic message on file with the *Drake Journal of Agricultural Law*).

103. *See* Western, *supra* note 13, at 15.

104. *See Data Ownership: Protecting Rights, supra* note 76, at 18.

105. *See* Max VandeLune, *RE: Who Owns the Information?* (posted Apr. 6, 1996) <maxvan@netins.net> (hard copy of electronic message on file with the *Drake Journal of Agricultural Law*).

106. *Id.*

107. *See Data Ownership: Protecting Rights, supra* note 76, at 18.

108. *See id.*

deposited in a government sponsored database to prove a farmer is guilty of pesticide use violations?

Many farmers consider their data highly proprietary and do not want their data shared with others without their consent.[109] Apparently their concern is valid, as some companies have already attempted (and failed) to purchase information for targeted sales purposes from some databanks.[110] In order to avoid problems, some databanks only assimilate summarized or generic data, while others adhere to strict confidentiality requirements.[111]

V. HOW ARE DATA OWNERSHIP AND CONTROL PROBLEMS CURRENTLY ADDRESSED?

Because farmers and the professionals who advise them are only now beginning to appreciate the importance of ownership and control of data, until recently these issues have largely been overlooked. Historically, the farming industry has relied on assurances, oral agreements and firm handshakes to settle an issue. However, with the increased industrialization of the agricultural production sector, such reliance may be (or perhaps should be) long gone.

Many farmers currently involved in precision farming techniques have entered service contracts when dealing with outside suppliers such as consultants or fertilizer dealers.[112] Unfortunately, these contracts are often woefully insufficient to deal with data rights problems that may arise in the future. Instead of dealing with the underlying ownership and control issues, these contracts often only delineate the "who, what, where, and how much" of the service to be provided.[113]

VI. SUGGESTIONS FOR THE FUTURE

A. *The Wise Farmer*

In the future all farmers, especially those who hire outside parties to provide precision farming services, would be wise to spell out data rights solutions in writing. The wise farmer should take care not to ignore the significant legal implications a precision farming system will have on business. Seeking some basic legal advice before problems arise may significantly alleviate any complicated legal issues in the future.

---

109. *See Data Ownership: Protecting Rights, supra* note 76, at 21.

110. *See id.*

111. *See id.*

112. *See* Anders Johansson, *RE: Who Owns the Information???* , (posted Apr. 5, 1996) <joha0078@maroon.tc.umn.edu> (hard copy of electronic message on file with the *Drake Journal of Agricultural Law*).

113. *Id.*

B. *The Wise Legal Practitioner*

Professionals in the legal sector, especially those who have many farmers as clients, first and foremost need to appreciate the likely impact precision agriculture will have on most of the industry within the next five to ten years. Practitioners should sufficiently educate themselves on the topic so they have a basic understanding of what precision farming is and what potential legal issues it raises.

When assisting farmers in entering contractual relationships with service providers, in addition to basic contractual provisions, practitioners should be prepared to address:

(1) The confidentiality of the raw data, generated maps, and management recommendations.
(2) Which party owns the raw data used in GIS mapping and VRT recommendations.
(3) Which parties have control of, or access to, that raw data. Can the farmer compel the transfer of that raw data from one service provider to another in order to maintain a current database if he changes service providers?
(4) Whether a service provider will provide GIS maps to the farmer in digital form as well as in physical form so farmers may seek variable rate application (VRA) of inputs from market sources other than the service provider who created the GIS map.
(5) Whether GIS maps and VRA recommendations are the property of the service provider or the farmer.
(6) Whether any of the farmer's data (in either raw or processed form) may be assimilated, deposited, or transferred to a third party database and whether or not permission from the farmer will be sought or need be granted.

Practitioners should also be prepared to address ownership and control issues of the data when drafting farmland leases on behalf of either landlords or tenants. The wise practitioner may well suggest these issues be addressed in the lease even before a tenant seriously begins contemplating the use of a precision farming system.

Certainly other legal issues will arise that will necessitate legal practitioners to be familiar with precision agriculture. Perhaps questions of privacy, trespass, negligence, or legislation will arrive in the future. The wise practitioner will keep his eyes and ears open.

VII. CONCLUSION

The jury is still out on whether or not precision farming technology will become the industrial force that so many claim. Admittedly, there is a steep learning curve currently in effect. There is skepticism from some that the ultimate costs may outweigh the benefits and that the technology needs more refinement before becoming truly useful on a large scale.[114] Nonetheless, many experts in the field claim the benefits of precision agriculture are so fundamental to the industry that the technology is here to stay in the long run.[115]

One thing appears relatively clear. If this brand new harvest of knowledge continues to grow, so too will the battle over ownership and control of the generated data.

---

114. *See* Steven H. Lee, *Satellite Fields, Farmers Plow New Ground with Technology,* DALLAS MORNING NEWS, Mar. 2, 1997, at 1H; Barbara Carton, *Farmers Begin Harvesting Satellite Data to Boost Yields*, WALL ST. J., July 11, 1996, at B4.

115. *See* MORGAN & ESS, *supra* note 4, at 3.