

M2M/IoT Applications in the Agricultural Industry

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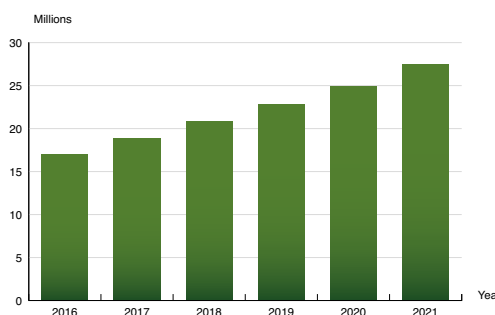


Wireless IoT technologies are set to enhance precision agriculture

Smart farming refers to the application of information and communication technology in agricultural production systems. The electrification of agricultural equipment has advanced over several decades but has accelerated in recent years due to improvements in computing power, data storage and wireless data transfer. Berg Insight's definition of smart farming solutions include systems installed in agricultural equipment, in the field or fitted to animals. Included are also backoffice IT systems which ensure that agricultural production can be planned, scheduled and managed to achieve efficient operations.

Precision agriculture is about managing variations in the field to increase crop yield, raise productivity and reduce consumption of agricultural inputs. While solutions such as auto-guidance and machine monitoring and control via on-board displays today are mainstream technologies in the agricultural industry, telematics and Variable Rate Technology (VRT) are still in the early days of adoption. Berg Insight estimates that the total market value for precision agriculture solutions was € 2.2 billion in 2016. Growing at a compound annual growth rate (CAGR) of 13.6 percent, the market value is expected to reach € 4.2 billion in 2021. Most major agricultural equipment manufacturers have initiatives related to precision agriculture although strategies vary markedly. Leading providers of precision agriculture solutions include Deere & Company, Trimble, Topcon Positioning Systems and Raven Industries. Other significant vendors include AGCO, Ag Leader Technology, DICKEY-john and Hexagon. Important players that specialise in data-oriented applications and agronomic services are the Monsanto subsidiary The Climate Corporation, Farmers Edge and DowDuPont with its Encirc services.

Remote monitoring solutions incorporate wireless connectivity, data logging, cameras and sensors that record measurements of environmental parameters to support decision making in agricultural production. In addition to weather and soil moisture content monitoring applications, these solutions enable growers to apply crop protection chemicals only when there is a disease or pest risk. Important players include Davis Instruments, Pessl Instruments with its METOS brand and Semios, all having installed bases of over 25,000 in-field sensor systems across a multitude of countries in North America, Europe and beyond. Top specialised providers of integrated soil moisture monitoring solutions comprise Hortau, Aquaspy and CropX. Remote irrigation control solutions are offered by the largest OEMs of central pivot irrigation machines and drip irrigation systems including Valmont Industries with its Valley Irrigation brand, Lindsay Corporation with its Zimmatic brand, Netafim and Jain Irrigation Systems. ►



Installed base of active wireless devices in agricultural production (World 2016–2021)

► Berg Insight estimates that shipments of in-field sensor systems and remote control units amounted to 107,000 in 2016. Growing at a CAGR of 43.5 percent, shipments are expected to reach 653,000 units in 2021.

Precision livestock farming technologies are mainly applied to the husbandry of dairy cattle, poultry and pigs. Consolidation and growth of dairy farms have resulted in larger herds per farmer, which makes manual observations challenging. Body-mounted sensor systems together with herd management software are used to achieve satisfactory herd health and timely insemination when a cow is in oestrus. A majority of the leading dairy equipment OEMs including GEA Group, Lely and BouMatic partner with specialised companies to provide advanced sensor technology for herd management. The world's largest dairy equipment manufacturer DeLaval offers its in-house developed activity monitoring system along with its milking and dairy farming infrastructure solutions. Important providers of sensor systems for herd management furthermore include Netherlands-based Nedap and The Allflex Group subsidiary SCR which both sell their systems to a number of leading dairy equipment manufacturers and genetics companies. Other significant players include Fullwood, Dairymaster and Afimilk which acquired Silent Herdsman in February 2016.

Berg Insight's outlook for the market for smart farming solutions is positive as agricultural production remains greatly underpenetrated by IoT technologies. The number of installed wireless devices for applications in agricultural production is forecasted to grow at a CAGR of 10.0 percent from 17.0 million connections at the end of 2016 to 27.4 million connected devices by 2021. Cellular connections amounted to 0.8 million at the end of 2016 and are expected to reach 3.1 million in 2021. The main application areas for cellular communication comprise telematics and in-field sensor systems. LPWA technologies are expected to achieve the highest growth rate and realise a significant market position in the remote monitoring and control segment. 802.15.4-based standards comprise the most employed wireless technology due to its wide adoption in dairy cow monitoring applications.

This report answers the following questions:

- What are the main applications for wireless IoT in agricultural production systems?
- Which are the leading providers of precision farming technologies and in-field sensor systems?
- What offerings are available from technology and service providers?
- How are the OEMs and agricultural input producers involved in the ecosystem?
- What are the main drivers and barriers for technology adoption in agricultural production?
- What are the precision livestock farming strategies of animal monitoring specialists and dairy equipment manufacturers?
- Which are the main application areas for cellular and LPWA connectivity?
- How will the market evolve in Europe, North America, Latin America, Asia-Pacific and MEA?

► Table of Contents



Executive Summary

1 The agricultural sector

- 1.1 **Agricultural production**
 - 1.1.1 Agricultural land use
 - 1.1.2 Irrigated area and irrigation methods
 - 1.1.3 Employment in agriculture
 - 1.1.4 Forestry
 - 1.1.5 The food and agribusiness value chain
- 1.2 **Agricultural commodities**
- 1.3 **Demand for agricultural commodities**
 - 1.3.1 Population growth and economic development
 - 1.3.2 Consumption of agricultural products
- 1.4 **Agricultural operations**
 - 1.4.1 Farm income and capital expenditures
 - 1.4.2 Mixed crop-livestock farming
 - 1.4.3 Crop farming
 - 1.4.4 Livestock farming
- 1.5 **Agricultural equipment**

2 Smart farming technologies and solutions

- 2.1 **Smart farming infrastructure**
 - 2.1.1 Farm equipment segment
 - 2.1.2 Field segment
 - 2.1.3 Livestock segment
 - 2.1.4 GNSS segment
 - 2.1.5 Network segment
 - 2.1.6 Backoffice segment
- 2.2 **Machinery management**
 - 2.2.1 Vehicle diagnostics and maintenance planning
- 2.3 **Precision agriculture**
 - 2.3.1 Guidance and automated steering
 - 2.3.2 Yield monitoring and mapping
 - 2.3.3 Precision seeding
 - 2.3.4 Precision fertilising
 - 2.3.5 Precision spraying
- 2.4 **Remote sensing**
 - 2.4.1 Satellite and drone imagery
- 2.5 **Remote monitoring and control**
 - 2.5.1 Weather monitoring
 - 2.5.2 Pest monitoring and control
 - 2.5.3 Irrigation management
- 2.6 **Precision livestock farming**
 - 2.6.1 Pig management
 - 2.6.2 Poultry management
 - 2.6.3 Beef cattle management
 - 2.6.4 Dairy herd management
- 2.7 **Data management and predictive analytics**
- 2.8 **Business models and strategies**

3 Market forecasts and trends

- 3.1 **Market analysis**
 - 3.1.1 Installed base and unit shipments
 - 3.1.2 Regional markets
 - 3.1.3 Wireless technologies
 - 3.1.4 Precision agriculture
 - 3.1.5 Dairy herd management
- 3.2 **Market drivers and barriers**
 - 3.2.1 Macroeconomic environment
 - 3.2.2 Regulatory environment
 - 3.2.3 Competitive environment
 - 3.2.4 Technology environment
- 3.3 **Value chain analysis**
 - 3.3.1 Precision farming industry players
 - 3.3.2 Farm equipment players
 - 3.3.3 Input industry players
 - 3.3.4 Dairy equipment industry players
 - 3.3.5 Telecom industry players
- 3.4 **Market trends**
 - 3.4.1 The emerging digital ecosystem requires a shift towards collaboration
 - 3.4.2 Larger herds drive the adoption of precision livestock farming technologies
 - 3.4.3 IoT start-ups are attractive to investors
 - 3.4.4 Dealerships remain as gateways to customers
 - 3.4.5 Freemium strategies will intensify competition between software vendors

4 OEM products and strategies

- 4.1 **AGCO**
- 4.2 **CLAAS Group**
- 4.3 **CNH Industrial**
- 4.4 **Deere & Company**
- 4.5 **Krone**
- 4.6 **Kubota**
- 4.7 **Mahindra & Mahindra**
- 4.8 **SDF**

5 Aftermarket solution providers

- 5.1 **Precision farming**
 - 5.1.1 Ag Leader Technology
 - 5.1.2 Agjunction
 - 5.1.3 DICKEY-john
 - 5.1.4 The Climate Corporation (Monsanto)
 - 5.1.5 Farmers Edge
 - 5.1.6 Hexagon Agriculture
 - 5.1.7 Raven Industries
 - 5.1.8 Topcon Positioning Systems
 - 5.1.9 Trimble
 - 5.1.10 Yara

5.2 Remote monitoring and control

- 5.2.1 Arable Labs
 - 5.2.2 Aquaspy
 - 5.2.3 Campbell Scientific
 - 5.2.4 CropX
 - 5.2.5 Davis Instruments
 - 5.2.6 Hortau
 - 5.2.7 Jain Irrigation Systems
 - 5.2.8 Libelium
 - 5.2.9 Lindsay Corporation
 - 5.2.10 Netafim
 - 5.2.11 Net Irrigate
 - 5.2.12 Pessl Instruments
 - 5.2.13 Semios
 - 5.2.14 Spensa Technologies
 - 5.2.15 Valmont Industries
- #### 5.3 Dairy herd management
- 5.3.1 Afimilk
 - 5.3.2 DeLaval
 - 5.3.3 Farmnote
 - 5.3.4 Fullwood
 - 5.3.5 GEA Group
 - 5.3.6 Smartbow
 - 5.3.7 Lely
 - 5.3.8 Moocall
 - 5.3.9 Nedap
 - 5.3.10 SCR (The Allflex Group)
- #### 5.4 Data management
- 5.4.1 365FarmNet
 - 5.4.2 Agrian
 - 5.4.3 Conservis
 - 5.4.4 DKE-Data
 - 5.4.5 DowDuPont Agriculture
 - 5.4.6 Farmers Business Network
 - 5.4.7 FarmLogs
 - 5.4.8 Farmobile
 - 5.4.9 Isagri
 - 5.4.10 SST Software

Glossary

About the Author



Fredrik Stålbrand is an IoT Analyst with a Master's degree in Industrial Engineering and Management from Chalmers University of Technology. He joined Berg Insight in 2016 and his areas of expertise include people tracking services, ITS in public transport markets and M2M applications in the agricultural industry.

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